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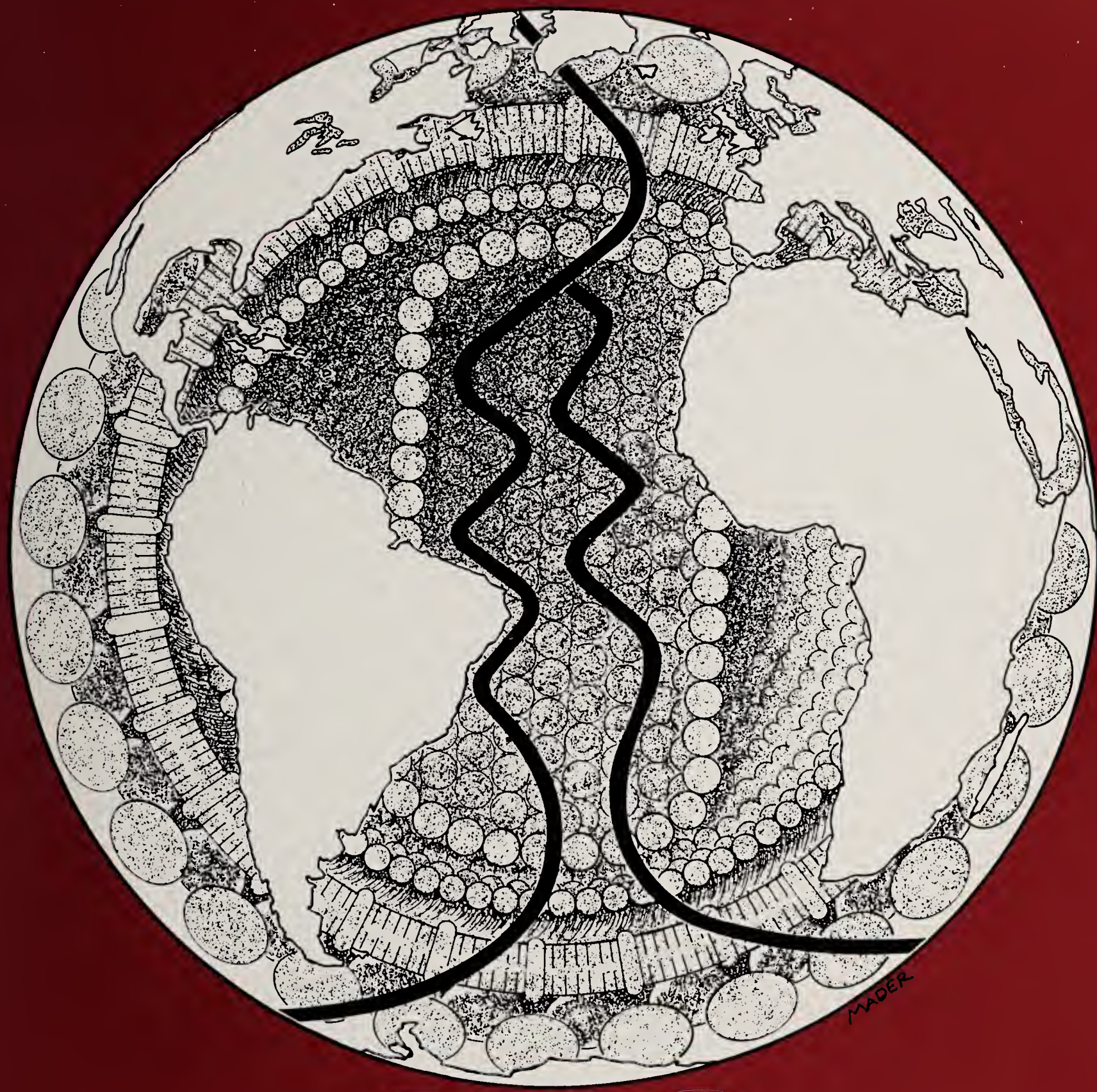

AIDS

- Feature Article: Human Immunodeficiency Virus

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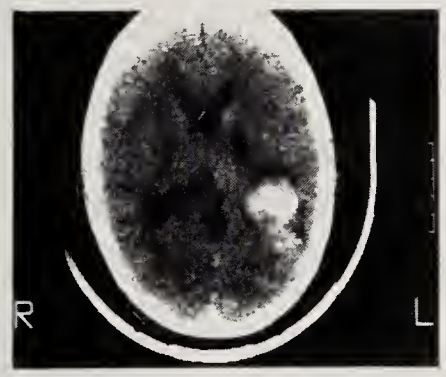
p. 4

p. 14



p. 22

p. 24

4 Plastic Surgery BY BARRY BIROSH, B.A.Sc AND BRUCE PYNN, B.Sc.
Reconstructive Microvascular Surgery

10 Orthopaedics BY STEVE MULHOLLAND
Cruciate Reconstruction

14 Medical Ethics BY CATHERINE BIRT, M.A.
Disclosing the Diagnosis

18 Feature Article BY HILLAR VELLEND, M.D.
The Human Immunodeficiency Virus

22 Neurosurgical Rounds BY JANICE MIYASAKI AND W. TUCKER, M.D.
Seizures and Intracerebral Hemorrhage

24 The Evolution of Medical Illustration BY KERRI WELLER, AAM

31 Clinical Medicine

34 Medical Education

35 Computers and Medicine

39 Poetry and Short Stories

41 Book Reviews

Cover Illustration: by S. Mader AAM

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• **THE MEDICAL ALUMNI ASSOCIATION** is the bridge between the graduates and the Faculty of Medicine, University of Toronto.

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• The Association is governed by graduates who give their time and talent voluntarily. There is one full time employee. Donations given for Student Aid are used entirely for that purpose. Trust funds are administered, without charge, following the direction of the donor.

Editorial

This marks the final issue of the University of Toronto Medical Journal for the 1986-87 season. This year the Medical Journal endeavoured to make certain changes and to create some new sections. The Computers in Medicine section was well received and focused attention on how medicine is being radically changed by technology. The Poetry and Short Stories section of the Medical Journal was another new section and served to contrast the talents of the medical student as scientist versus the medical student as poet. The research papers submitted to the Medical Journal were all of excellent calibre, many dealing with exciting new medical concepts.

In this issue the feature article deals with a controversial and very important topic, the Acquired Immune Deficiency Syndrome (AIDS). This disease gained worldwide prominence in the early 1980s and ever since, practitioners have been struggling to keep up with media attention and answer the many questions of concerned patients. Very few diseases have captivated the public and altered behaviour in such a short time as AIDS. In order to give the student and practitioner an overview of this topic, Dr. Hillar Vellend has prepared a paper containing the most recent information. Dr. Vellend, head of the Infectious Disease Division of Toronto General Hospital, deals with many of the AIDS patients in Toronto. His large body of personal clinical experience, plus his interest in infectious diseases from an academic standpoint, allow him to discuss the disease from a clinical approach with a solid theoretical discussion of the virus involved.

As the final feature article of this season, the University of Toronto Medical Journal hopes it is both informative and enjoyable. The Medical Journal is a very complex organization which is run solely by volunteer medical students. The Editors-in-Chief would like to take this time to thank all those involved in the Journal for their dedication and commitment to producing the finest journal possible.

Thank you for a wonderful year and we hope the Journal has been both stimulating and entertaining.

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Reconstructive Microvascular Surgery: An Overview

*Barry A. Birosh, B.A.Sc., 8T8 and Bruce R. Pynn, B.Sc.**

Abstract

Microsurgery refers to surgery performed with the visual aid of the operating microscope which typically magnifies the field 5 to 20 times. Sophisticated microscopes, precise microinstruments and microsutures are required for these delicate tasks. Microsurgery has revolutionized the field of reconstructive surgery. It provides a method for anastomosing tiny vessels and repairing nerves, thereby allowing the ***replantation*** *and single stage transposition of body tissues. This technology is now being put to use in the repair of a wide array of disabling and disfiguring lesions.*

Introduction

The application of microvascular techniques began in Toronto 14 years ago, and now Toronto is internationally recognized as a centre for microvascular reconstruction. The purpose of this paper is to review the developments of microvascular reconstructive surgery over the last two decades with examples drawn from the Toronto experience. The first microvascular surgery case here was a digital replantation performed in 1973 by Dr. Ralph Manktelow. By 1979 the Toronto Tri-Hospital Microsurgery Team was formed including Dr. Ralph Manktelow of Toronto General Hospital, Dr. Ron Zuker of the Hospital for Sick Children and Dr. Nancy McKee of Mount Sinai Hospital. Since 1982, Drs. Jim Mahoney and Brian Boyd of St. Michael's and Toronto General Hospitals, respectively, have joined the team. Individually and together they have performed hundreds of replantations and reconstructive procedures.

Current microvascular techniques are very similar to those developed almost a century ago[13]. However, these techniques could not begin to be applied to reconstructive surgery without the concomitant development of microinstruments and sutures. Twenty-four years ago, replantation surgery was the first clinical benefactor of these microvascular advancements. This work was the impetus for the development of many microsurgical procedures which revolutionized the field of reconstructive surgery.

Replantation surgery can be divided into two main areas: major limb and digital replantation.

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Major limb replantation

An extremity replantation is a very complex surgical problem. The first order of priority is to resuscitate the patient and only then to initiate replantation, if advisable.

The decision to replant an extremity involves many factors. A badly mangled limb or one that has been separated from the body for too long may simply not be replaceable. Amputation injuries that stand the best chance of reattachment are guillotine and saw cuts. These 'clean' cuts cause less damage to the ends of the severed tissues than do bad crush or avulsion injuries, and therefore provide a better chance for healing and return of function after reattachment. Guillotine type injuries also allow the easy location and approximation of the severed ends of nerves and vessels. The chance of a good replant following a bad crush or avulsion injury is poor because of multiple fractures and extensive vessel damage in both the amputated part and the stump.

Since the surgeon is best able to determine whether or not a detached limb can be replanted, all such limbs should be handled as though they will indeed be reattached. This means putting the limb in a watertight bag and then on ice. The patient himself must have an active role in deciding whether a detached limb should be replanted. The patient must be informed that the replanted part will never be normal but that the capacity of the distal replanted upper extremity for sensory innervation and immediate reconstruction have unique advantages over most contemporary extremity prostheses[11]. Since the important functions of the lower limbs are simply weight bearing and locomotion, a single lower limb amputation can be suitably corrected via a modern prosthesis. Replantation is generally performed only in the case of a bilateral amputation of the lower extremities. In a few extreme cases, the best amputated part has been transplanted to the best stump e.g. right foot replanted to the left leg[14]. It has been shown that replantation of extremities in the young does not prevent normal growth of the replaced part. In fact, children have a greater capacity for nerve regeneration and adaptation and are the best candidates for limb replantation.

Guillotine, saw cuts, and moderate crush injuries are

common causes of amputation in the wrist and lower forearm. These sites of injury are favourable for replantation because of the relative absence of muscle and the distal level of the nerve injury. Amputations proximal to the mid forearm present extra problems due to the large muscle mass involved. Extensive muscle necrosis is a major concern because it increases the potential for infection and increases the risk of limb loss or even death of the patient. Although revascularization of an amputated proximal forearm is made easier by the larger vessels, the nerve repair is the limiting factor governing the eventual restoration of function. Proximal to the mid forearm, nerves have a more complex, mixed-fascicular organization than nerves found in the lower forearm. Amputations have a poorer chance of recovery since it takes longer to reinnervate the musculature of the hand.

Bone shortening is frequently required in extremity replantation in order to allow the union of vessels and nerves. Gaps in both veins and arteries are bridged using vein grafts. Etiher epineural or fascicular suturing of nerves may be performed, the latter method requiring more time but potentially yielding better results[12]. The primary repair of vessels, nerves and tendons is desirable due to the formation of scar tissue which may interfere with any later surgical repairs.

Digital replantation

The indications for replantation of an amputated digit depend on the type of injury, the age, health, work and hobbies of the patient, as well as his personal preferences.[6]. Generally, digits amputated distal to the distal portion of the middle phalanx are not reattached because the small potential increase in utility of the hand does not justify the replantation, immobilization and post-operative rehabilitation required. The loss of function in these cases seems to be insignificant[6]. Single amputated digits, excluding thumbs, are not usually reattached except in children and in special circumstances (Figure 1). A replanted finger that is not functional can be a true hindrance to the rest of the hand. Other than thumbs, bad crush and avulsion injuries are not usually replanted for reasons given earlier. Attempts at reattachment of badly damaged digits result in low survival rates and poor quality of long term function. In a hand with multiple amputations, as many fingers as possible are replanted (Figure 2). The finger that has the best chance of survival is usually attached first. The amputated fingers (and their components) are used to provide the best reconstruction possible. Sometimes this means that a finger is replanted to a different stump.[10].

The sequence of repairs for a typical digital replantation is skeletal fixation (which usually involves bone shortening), repair of the extensor tendon, two veins, the flexor tendon, one artery, both digital nerves and, finally, skin closure. Anti-coagulants are often used post-operatively to prevent thrombosis of the reanastomosed vessels. The large success of digital replantation may be partially due to the increased use of interpositional vein grafts to eliminate tension in the anastomosed vessels. Tension in the vessel wall often

Figure 1: Thumb Amputation. A, complete amputation of the left thumb by a table saw in a 40 year old man. B, appearance 1 year post-operatively showing active movement and useful opposition. Note: The thumb is slightly shorter than that of the right hand.

Figure 2: Multiple Digit Amputation. A, partial amputation of four digits by a radial arm saw in 40 year old man. B, x-ray of the traumatized hand. C, x-ray of the amputated digits. D, appearance 1 year post-operatively, still able to play the trumpet.

causes spasm and thrombosis. Survival rates of 85-90% have been reported in the literature. To date, the Toronto Microsurgical Team has replanted approximately 300 digits with this same very high survival rate.

Other body parts that have been successfully replanted after traumatic amputation include the scalp, ears, nose, and penis.

Free flap operations

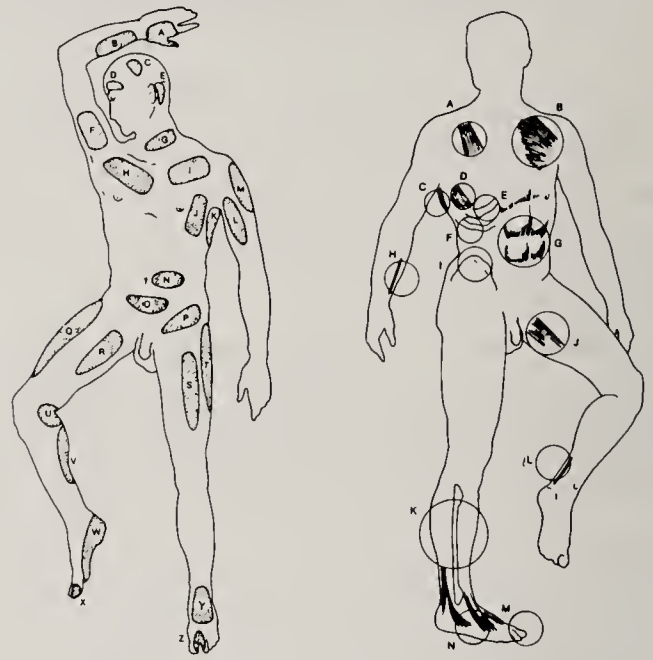
With the advent of microvascular techniques, the plastic surgeon now has the ability to transfer tissue from its original bed to a distant recipient site in a single operation, provided revascularization is possible. This has opened up seemingly unlimited possibilities in reconstructive surgery. The single stage free flap operation has replaced the multi-stage tube pedicle flap with its prolonged hospitalization, financial burdens and psychological costs. In the older tube pedicle flap operation the tissue to be transferred was first isolated from the donor site with the vascular supply left intact. The tissue was then placed at a new site in the body and a tube of skin constructed around the vascular pedicle connecting the two sites. The tissue would eventually obtain a vascular supply directly from the new site, so that the old pedicle and surrounding skin tube could be removed. When the donor and recipient sites were far apart on the body, the operation had to be repeated several times whereby the grafted tissue was walked along the body in several long and traumatic steps (Figure 4).

A

B

Figure 3: Tube Pedicle Flap. A, the flap in position on the nose. The deltopectoral flap was used for nose coverage and reconstruction. B, division of the pedicle.

A free flap is a piece of tissue that can be completely removed from one area of the body and revascularized at a different site in a single operation. Currently there are more than 54 different donor sites documented, ranging from skin and subcutaneous tissue groin flaps through a variety of composite skin, bone, muscle, and nerve transfers to the use of intra-abdominal organs such as the jejunum and omentum (Figure 4). Suitable



Donor sites for free flaps. **A. Donor sites for coverage.** A, *part of palm,* B, *forearm,* C, *scalp,* D, *forehead,* E, *retroauricular skin,* F, *medial arm,* G, *neck skin,* H, *deltopectoral,* I, *thoracoacromial,* J, *lateral thoracic,* K, *latissimus dorsi myodermal flap,* L, *lateral arm skin,* M, *deltoid,* N, *abdominal skin with rectus muscle,* O, *lower abdominal skin with rectus muscle,* P, *groin flap,* Q, *lateral thigh skin and muscle flap,* R, *gracilis myodermal flap,* S, *rectus femoris myodermal flap,* T, *tensor flap,* U, *saphenous,* V, *medial gastrocnemius,* W, *sole skin myodermal flap,* X, *partial great toe,* Y, *dorsalis pedis,* Z, *first toe web space and sole of foot skin. Not included in the diagram are temporalis fascial flap, gluteus maximus myodermal flap, lateral thigh, and the entire forearm.* **B. Muscle, bone and nerve donor sites.** A, *pectoralis minor,* B, *pectoralis major,* C, *latissimus dorsi,* D, *serratus anterior,* E, *rib with anterior blood supply,* F, *rib with posterior blood supply,* G, *rectus abdominis muscle,* H, *radial nerve,* I, *iliac crest,* J, *gracilis muscle,* K, *fibula,* L, *sural nerve,* M, *great toe, second toe, and metatarsal phalangeal joint,* N, *extensor brevis muscle. (From: Shaw W: "Microvascular Free Flaps: Survival, Donor Sites, and Application." Chapter 1 in Buncke HJ & Furnas DW (eds.): "Symposium on Clinical Frontiers in Reconstructive Microsurgery." CV Mosby, St. Louis, 1984. Reproduced with permission.)*

Figure 4: Donor Sites for Free Flaps

donor sites must fulfill certain anatomical and functional qualifications. The vascular supply of the ideal free flap consists of an anatomically consistant main pair of vessels, referred to as the major vascular pedicle, with the artery supplying the flap and the vein draining the same tissue. The vessels must also be large enough to be anastomosed using microsurgical techniques. The donor site should remain functionally useful and aesthetically acceptable.

Various composite tissue transplantations have proven to be advantageous following extensive osseus and soft tissue injuries. The first free flap operation was performed in Toronto in 1975 and since that time more than 200 free flap transfers have been performed with a survival rate of 94%.

Bone flaps

In the recent past, some patients with severe motorcycle injuries often required leg amputations because of a large bone and soft tissue defect in the lower leg. However, such bony defects can now be reconstituted with a composite flap. For example, the iliac crest osteocutaneous flap is capable of bridging gaps of 6-12 cm. as well as providing the overlying soft tissue and skin coverage (Figure 5).

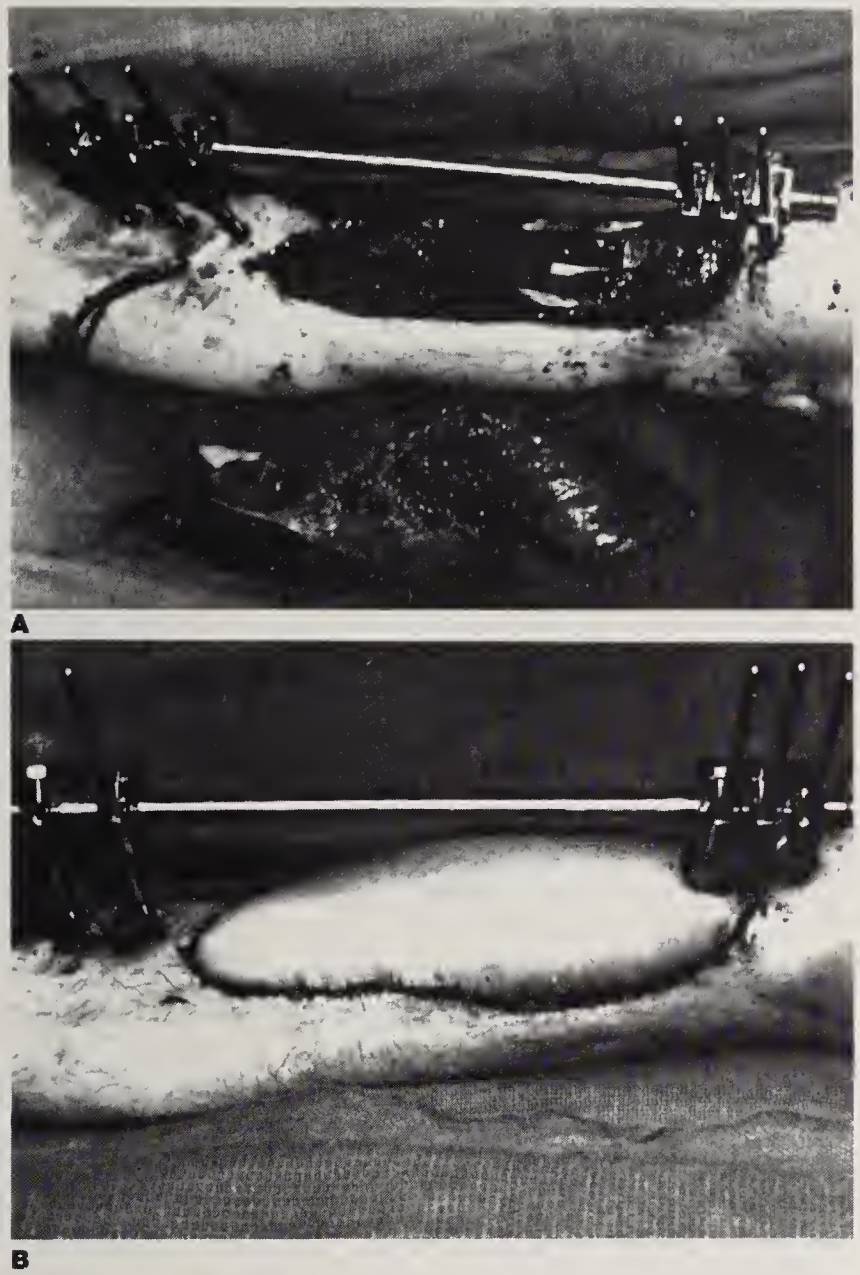


Figure 5: Composite Flap. A, traumatized lower leg with large bony defect in Hoffman apparatus, with free iliac crest osteocutaneous flap resting beside recipent bed. B, Post-operative view of reconstructed defect.

Longer bony defects which may exist either congenitally or following trauma can be restored with a free vascularized fibula. The fibula is nourished by a blood supply arising from the peroneal vessels that enters the middle third of the shaft[5]. The fibula graft length can be tailored to meet the bony deficit, provided the nutrient blood supply is included. Removal of a large portion of fibula leaves the patient with little or no functional deficit. The first free fibula transfer was performed in Toronto in 1978. The free vascularized fibula autograft has added a new dimension in reconstruction of the knee after *en bloc* tumor excision[3]. The autograft provides vascularized support for a cadaver allograft.

The jaw is another area that can be reconstructed with smaller composite bone flaps. There is a variety of areas on the body where small vascularized portions of bone can be safely removed. These areas include the second metatarsal which is suited for anterior mandible reconstruction[2]. A rib can be used for reconstruction of the entire ramus of the mandible. The iliac crest also possesses the correct curvature for this reconstruction.

One stage toe-to-thumb reconstruction can restore the function of a traumatized hand in the case where replantation of the thumb is impossible due to a bad avulsion or crush injury (Figure 6). The primary goal of

Figure 6: Toe-to-Thumb Reconstruction. A, appearance of dominant hand with loss of thumb. B, appearance of right foot after removal of second toe. C, view of the palmar aspect of the hand and newly acquired "thumb". D, appearance 1 year post-operatively showing good functional capacity and opposability.

the transplanted toe is to provide pinch and improve grip strength of the hand. This reconstruction is superior, functionally and cosmetically, to pollicization of another normal digit. It has been shown biomechanically that the toe can be removed without functional deficit or gait change. There has been a 90% survival rate and excellent return of function.

Skeletal muscle flaps

Free skeletal muscle transfers have greatly expanded the reconstructive capabilities of the plastic surgeon. They are used to provide cover and contour to exposed or defective areas, and to restore motor function. A muscle can be removed from one part of the body and transferred to a distant traumatized recipient site, with survival and restoration of function ensured by microneurovascular anastomoses and an expected restoration of function. This type of procedure should be considered in patients who lack finger flexion due to a loss of forearm musculature such as in Volkmann's ischemic contracture (Figure 7).

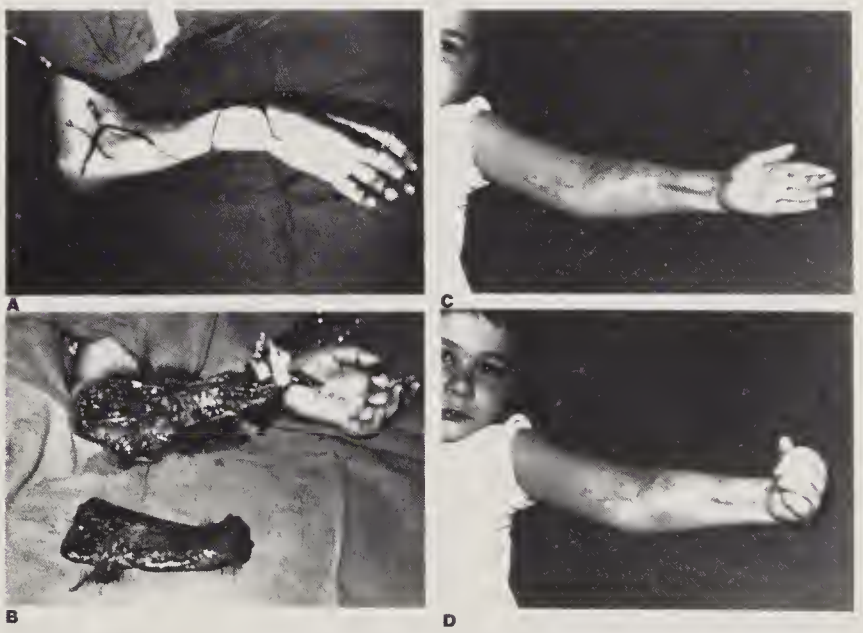


Figure 7: Free Muscle Transfer. A, residual deformity of Volkmann's ischemic contracture, arm lacking flexor musculature. B, intra-operative view with gracilis adjacent to recipient bed. C, post-operative view 15 months later. D, patient able to flex fingers with gracilis acting as flexor musculature.

The selection of the optimal muscle depends on many factors such as excursion and power required for functional return, anatomic qualities suitable for transplantation, and the degree of functional disability, if any, caused by the muscle's removal. Several muscles are commonly used for transplantation including pectoralis major, latissimus dorsi and gracilis[9]. The gracilis, with its strap-like qualities, is often the muscle of preference. The ultimate functional outcome of a transferred muscle is multi-factorial but two of the most important factors seem to be the motor nerve repair and the tension at which the muscle is placed in the recipient site. The gracilis is marked while still resting *in situ* before the transfer to ensure optimal tension in the transplanted site.

Dr. Manktelow performed the first free muscle transfer in Toronto in 1976 after travelling to China and Japan to observe and study microsurgery. Since that time he has transplanted muscles in more than 30 patients. The results are very encouraging with 95% survival, an excellent range of motion and up to 50% return of grip strength[7].

Free muscle transfers have also been used for reanimation in the treatment of facial paralysis[7]. The main aim has been to achieve movement symmetrical with that of the opposite normal side of the face. This is often a very difficult task depending on the type of facial paralysis since there are 16 mimic muscles on each side of the face that are controlled by the facial nerve[7]. A problem in the past has been the size of suitable muscles that can be transplanted with microneurovascular anastomoses. The gracilis and latissimus dorsi have been used but are too bulky and powerful for the delicate musculature of the face. Smaller muscles with discrete motor territories such as the serratus anterior, pectoralis minor, and a portion of the gracilis are more suitable, and are preferred in Toronto.

Skin flaps

The body also contains a multitude of donor sites for cutaneous free flaps which are used to provide coverage of exposed areas, to repair defects due to trauma or burns, and to restore sensation to important sites, as discussed later.

Anatomical studies have defined free skin and subcutaneous flaps in most parts of the body, though specific sites are preferable for various reasons[16]. Some sites are chosen because of the potential for sensory reinnervation, while other sites are chosen because the underlying muscle can be removed with the skin such as the latissimus dorsi, and rectus abdominis musculocutaneous flaps. Reconstruction with musculocutaneous flaps is a rapid, reliable method to achieve wound cover and contour in cases of limb defects. These flaps usually have very long pedicles and excellent vascularity. It is this excellent vascular component in the muscle which aids in combatting local infection. These flaps have also been very useful in head and neck reconstruction as well as breast reconstruction after radical mastectomy. Musculocutaneous flaps are very attractive to the reconstructive surgeon because of their large size and the increased diameter of supplying vessels[9].

The groin skin flap is popular because the scar may be hidden even by a bikini, and primary closure is possible. Texture, thickness, and hair coverage are other factors affecting the selection of cutaneous free flaps.

Nerve flaps

The peripheral nerve is another tissue that can be transplanted within the body. Nerves can be transplanted to repair both sensory and motor deficits. Sensory island flaps are cutaneous or musculocutaneous flaps that also contain a sensory nerve which can be reconnected at the recipient site to provide the new site with sensation. One of the early sensory island free flaps was the dorsalis pedis flap used to innervate areas of the hand. It has since been used in the reconstruction of many areas of the body including the penis. Other sensory island flaps such as groin, deltoid, intercostal, and tensor fascia lata flaps can be used for sensory surface coverage of many parts of the body.

Nerves can also be transplanted alone, without associated tissues. In nerve grafts, the axons die but the endoneurial sheaths and Schwann cells provide scaffolding for the regenerating axons. Tension is a critical factor in the repair of severed nerves. Any tension between sutured nerve endings may compromise the functional recovery of the nerve, possibly due to the proliferation of connective tissue[4]. Therefore, nerve gaps wider than 2 cm. are usually repaired by multiple fascicular nerve grafts.

Adequate revascularization is the major factor determining the success or failure of a nerve graft. Nerve grafts are revascularized by vessels entering the proximal and distal nerve stumps and by the ingrowth of blood vessels through the epineurial sheath from the surrounding tissue bed. Revascularization must proceed quickly for the grafted tissue to survive. Trouble arises when the grafted nerve is too long or too thick, or is placed in a scarred bed. Traditionally these problems have been partially overcome by the use of cable grafts, made up of multiple grafts of thinner nerves that together are equivalent in size to the damaged nerve. Each of these thin nerve strands then becomes revascularized independently.

Presently, research is being carried out on free nerve grafting with surgical revascularization. The procedure permits the transfer of a major nerve with its blood supply. More importantly, there is evidence that free vascularized nerve grafts may provide faster regrowth of nerve axons, resulting in earlier reinnervation[17]. This is crucial in proximal nerve injuries, where reinnervation may take a year or longer, allowing severe atrophy at the deinnervated site. The utility of free vascularized nerve grafts compared with unvascularized grafts has yet to be properly evaluated.

Spare parts

A large number of sources for the replacement of bone, muscle, skin and nervous tissue have been cited and many more such donor sites exist. With the development of microsurgery and its techniques for joining together small vessels and nerves, the human body can

now be viewed as its own warehouse of replacement parts.

The foot provides a beautiful example of how one part of the human body can supply needed parts for other areas of the body, with no functional loss at the donor site (in this case gait and weight bearing)[15]. Figure 4 illustrates the common donor sites of the foot, which include each of the tissues listed above.

The great or second toe may be removed without gait change and used to reconstruct a severed thumb[1]. The second metatarsal has been used for mandible reconstruction[2]. The extensor digitorum brevis muscle has been transferred with a branch of the deep peroneal nerve and a branch of the dorsalis pedis artery for use in facial reanimation. No functional loss is observed in the foot after such an operation. The dorsal foot veins can easily be removed for veins. Their 1.0 to 1.5 mm. diameter makes them suitable for use as interpositional grafts for distal extremity replantation. As well, two sensory skin grafts from the foot are of great value. The dorsal free flap has already been mentioned; the other is the first web space skin flap used for transfer to the volar surface of the fingers and hand[16]. This sensory island flap provides superior two point discrimination at the transplanted site.

Future outlook

The development of microvascular surgery has revolutionized the field of reconstructive surgery by allowing the replantation of amputated extremities and the transplantation of composite tissues for reconstruction. Now there are new barriers to advancement, some of which are already being challenged by attempts to control the immune response in order to allow allografts and xenografts. On a larger time scale, scientists are exploring the mechanisms of cell growth and differentiation; technology which may some day change the role of the reconstructive surgeon from that of replacing parts to that of regenerating them.

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The Transplantation of Allogenic Tendon Grafts in Anterior Cruciate Ligament Reconstructions: A Review.

Steve R. Mulholland 8T8

Introduction

The emergence of a more exercise-conscious society over the last decade has coincided with an increase in the incidence of knee injuries[7]. The popularity of sporting activities such as racketball, squash, tennis, soccer, basketball, and aerobics, which involve rapid stopping, starting and pivoting manoeuvres, has resulted in a relative preponderance of anterior cruciate ligament (ACL) injuries[27]. Untreated, ACL injuries often lead to significant disabilities including locking, torn menisci, chronic instability and osteoarthritis[8 14 17]. Various operations have been described for correction of the instability due to ACL insufficency[13 14 16]. Most commonly, these operations employ autogenous tendon or fascia to reconstruct the ACL. Over a decade ago, Dr. D.L. MacIntosh, an Orthopaedic surgeon at the Toronto General Hospital, developed one of the most popular operations, in which a strip of tensor fascia lata is used for an intra-articular, anatomical reconstruction of the ACL[10]. However, the amount of autogenous tendon that is available for ACL reconstruction is limited by the fear of creating a defect at the host's own donor site. Rupture of the patellar ligament after it's use in ACL reconstruction has been reported[2].

In the interest of preserving the biomechanical and anatomical integrity of the hosts donor sites, it would be beneficial if allogenic tendon could be used to substitute for the ACL. This paper reviews the recent transplantation of allogenic tendon grafts in anterior cruciate ligament reconstruction.

Indications for surgery — Patient Profile

Examination of the work done by Shino et al[24], (83 patients — the worlds largest series of allogenic ACL transplants,) can lead to the development of a patient profile for whom this form of surgery is indicated.

The majority (95%) of patients sustain the initial injury during sporting activities[24]. At the time of surgery, the chief complaint in over 85% of patients is multiple episodes of giving way, which was refractory to vigorous rehabilitation[12 24].

The general minimal criteria for reconstruction of the ACL are functional instability during daily activities or sport at a recreational level, and a moderate to severe Lachman sign that reproduces the sensation of instability[24 27]. At this point, patients satisfying the aforementioned critera are generally arthroscoped and examined under anaesthesia (EUA) to assess meniscal and ligamentous integrity, as well as further instability, Anterior Drawer, and Pivot Shift signs[10 25].

Virtually all pre-operative radiographs of these patients are normal, with no appreciable degenerative changes other than the occasional osteophyte in the intercondylar notch.

Thus, for those patients in which torn, severely attenuated, or non-functioning ACL's are demonstrated on arthroscopy, and who show little improvement in stability after rehabilitative therapy, an allogenic tendon transplant to reconstruct the ACL can be advised.

Surgical Technique
Graft Collection

Using sterile techniques, allogenic tendons (predominantly the tendocalcaneous and tibialis anterior tendons) are removed from non-infected amputations, or fresh cadavers within two hours of amputation or death. Each graft is 8 to 10 mm in diameter and at least 7 cm long and is placed in a sterile, airtight tube and stored at -80° C for at least 10 days before use.

Intra-articular operation

The knee is first inspected through a medial parapatellar incision and any meniscal pathology can be treated by partial menisectomy or tibial spine repair. Eroded articular surfaces, osteophytes, or tibial spines can be shaved or removed, and the remnants of the ACL are excised.

Drill holes are then made in the tibia and femur, creating an anatomical pathway for the allogenic tendon graft. An 8 mm trial ligament of woven Dacron is pulled through the holes into place and used to confirm that the reconstructed ligament will be tight throughout the range of motion. At this point, the position of the drill holes can be corrected.

A frozen-stored allogenic tendon is selected and maintained for ten minutes in an antimicrobial-saline solution. Sutures are then placed in each end of the tendon and these sutures are led through the drill holes

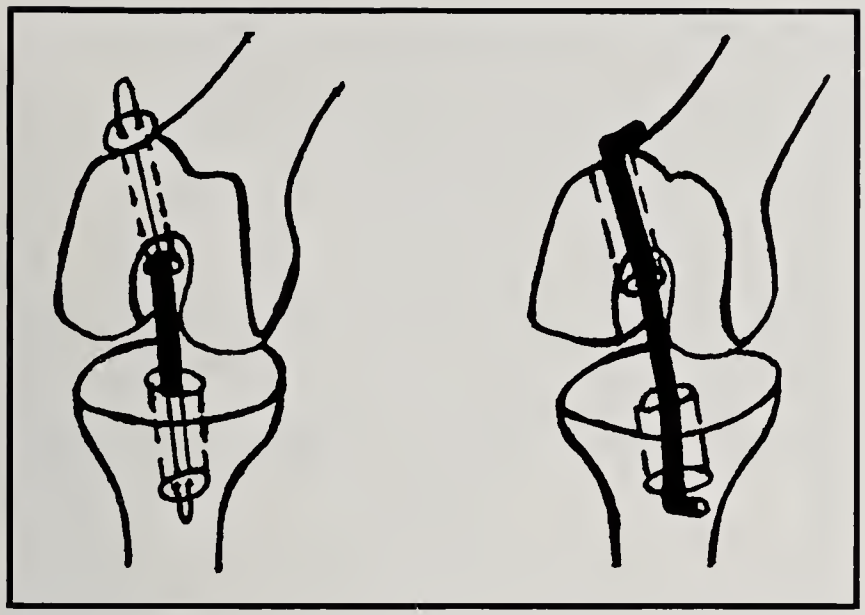

Figure 1. This illustrates the drill holes placed through the tibia and femur for reconstruction of the ACL using a free tendon allograft Left — If the graft is too short, the sutures extending from each end of the graft can be tied over bone buttons and pulled to the correct tension. Right — If the graft is long enough, it can be secured directly to the bone with staples.

and, either tied to buttons, or, if the graft is long enough, stapled directly to bone (Fig. 1).

Various extra-articular procedures for controlling rotatory instability can be performed to augment the ACL reconstruction[6 11 25].

Post-operative management

The patient is placed in a toe to groin cast, with the knee flexed 40° to 50°, for 6 weeks. After the cast is removed, no weight bearing is permitted for 7 weeks, during which time the patient is put through strenuous active flexion exercises (not allowing the extension to go beyond 30° during the first 4 weeks).

Muscle strengthening is directed primarily at the hamstrings (to help the ACL graft resist the anterior motion of the tibia with respect to the femur) and the patients are encouraged to start jogging after 8 months, followed by a return to other forms of athletic activity after 11 to 12 months.

Results of tendon transplant

The early results of these tendon transplants appear to be excellent. In the largest series, Shino et al reported that none of their patients experienced post-operative giving way. Further, the average range of motion achieved was -10° / 130° and all had returned to full sporting activities by 18 months post-op[24].

There was no evidence in any patient of effusion, synovial thickening, or skin necrosis which might indicate allogenic tendon rejection[24]. All series reported no abnormal bone response in radiographs taken at 2 years post-op and the drill holes had repaired completely.

Complications appear to be minimal and include one case of a superficial staphylococcal infection around the skin incision and one case of a stiff knee which required arthrotomy to remove intra-articular adhesions.

Discussion

There is still considerable controversy over the long-term effects of insufficiency of the anterior cruciate ligament. The basic question being, to operate or not to operate? Some patients with ACL insufficency, who never receive surgical intervention, can participate in the activities of daily living and sports without experiencing subsequent instability, meniscal tears, or degenerative changes[1 11 17].

Other series report that patients with ACL insufficiency risk a significant probability of sustaining a tear to one meniscus (50% to 78%), or both menisci (38%) and subsequent degenerative osteoarthritic changes[5 7 8 14 21].

It appears that those patients who benefit most from ACL reconstructive surgery have, following initial knee trauma, experienced multiple episodes of knee instability, have demonstrated ACL insufficiency on arthroscopy and EUA, are refractory to rehabilitative therapy, and have a strong desire to return to sporting activities.

Cadaveric studies have shown intra-articular reconstruction of the ACL to be superior to extra-articular procedures in providing primary restraint against excessive anterior translation of the tibia with respect to the femur and in correcting functional rotatory instability[4 9 15].

In the past, autogenous portions of the patellar ligament, or tensor fascia lata have been employed in ACL reconstruction, primarily for their ease of access and adequate tensile properties[20]. Although the results of these autogenous grafts have been fairly good, in certain cases, it has been shown that this autogenous tendon harvest can disrupt the biomechanical and anatomical integrity of the donor tissue and can lead to post-operative functional disabilities[2].

Unfortunately, the artificial ligaments and heterologous prostheses that have been developed to date have proven to be unsatisfactory substitutes in ACL reconstruction[23 26].

In the past, a variety of allogenic fibrous tissue grafts have been successfully transplanted in reconstructive surgery involving the shoulder, hand, and foot [3 19]. It appears that the immunological response to these allogenic tendon grafts is negligible[18 24]. Freezing is a widely accepted method of storing tendons, and at -80° C prevents infection and has been shown to further decrease the hosts immune response[22]. The freezing performed at this temperature does not appear to alter the mechanical properties of ligaments or tendons[20].

Arthroscopic analysis of some 2 year post allogenic ACL tendon grafts revealed that these tendons were thick, taut, and revascularized[24].

Thus, with such good clinical results, allogenic tendon transplants can now be considered an attractive alternative to patients suffering from chronic ACL insufficiency. However, although exciting, the results of this procedure are still tentative and they must stand the test of time before tendon transplantation in ACL reconstruction is to become the treatment of choice.

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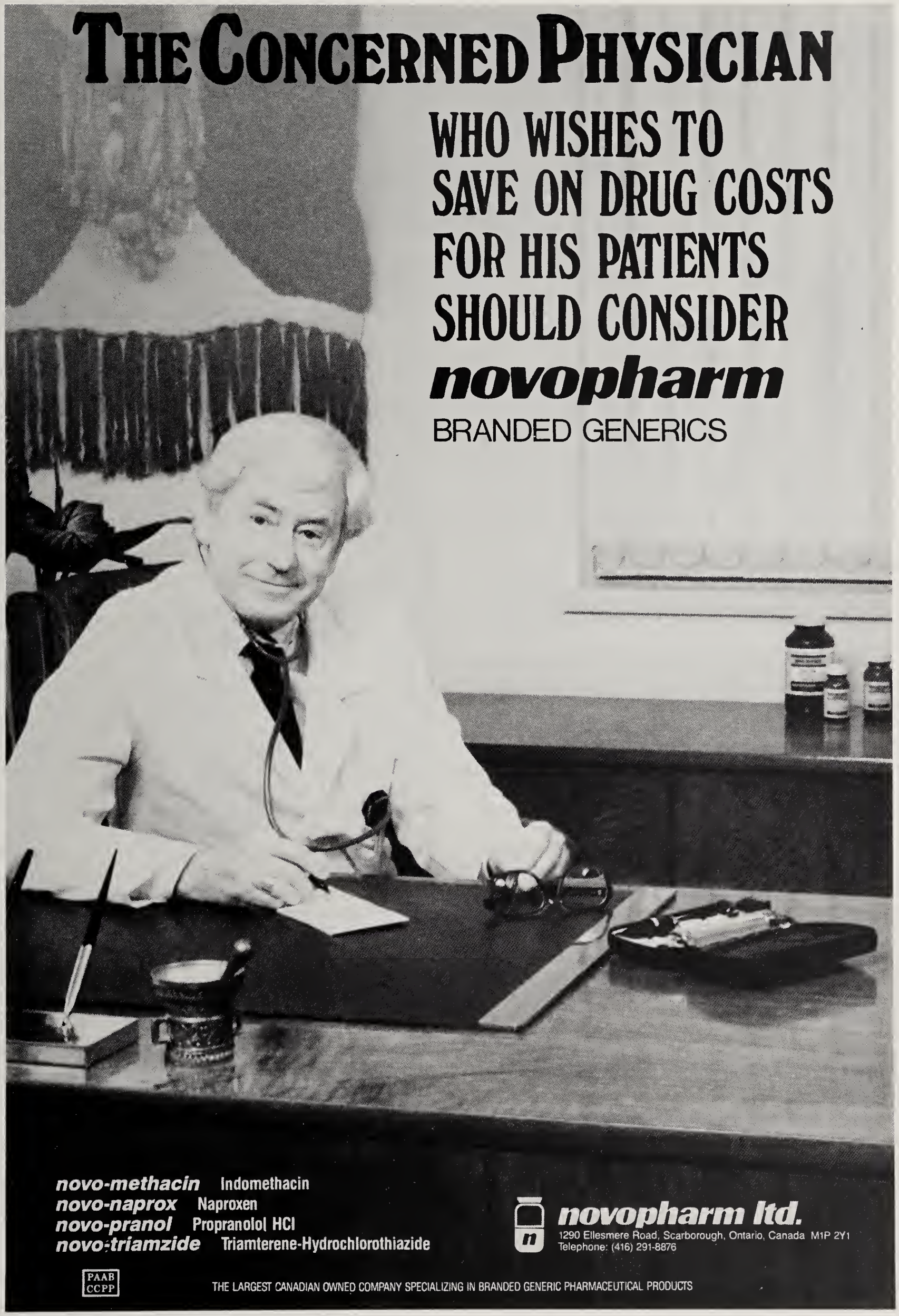

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Disclosing the diagnosis: How to tell patients they have cancer

Catherine Birt M.A., 8T9

The art of communication with the patient has received much attention over the past few years. This paper discusses one important aspect — that of informing the patient that they have a serious disease, in other words, giving them any bad news. One useful definition of bad news, given by Buckman (1984a), is "any information likely to alter drastically the patient's view of their future". Discussions in the literature usually centre around the communication of a diagnosis of cancer, since this is perhaps the most feared of diseases, but the principles apply to any disease with a poor prognosis.

The topics that are covered in this paper include the arguments for and against disclosing the diagnosis, a review of doctors' and patients' attitudes, and the techniques that doctors use when breaking bad news to their patients.

The practice by doctors of withholding a poor diagnosis from their patients, often while disclosing it to family members, is a longstanding one, with precedents going back to the time of Hippocrates. Reiser (1980) reviewed writings on the subject by Hippocrates, medieval practitioners and one Dr. Thomas Percival, an influential writer in the early 1900's. The basic theme across all these centuries was that doctors should not disclose the diagnosis, since the information may do great harm if, for example, the patient loses hope. One of the basic tenets of medicine is Hippocrates' own statement "First, do no harm." Dr. Percival, (cited in Reiser, 1980) stated that patients do not have a right to receive information that would harm them. Other reasons that have been given by those doctors who prefer to withhold a diagnosis, include the possibility of suicide or increased distress, and the difficulty of deciding which patients would be capable of handling the information. Indeed, many patients simply do not want to know, while others may not understand even when told. A recent paper by Brewin (1985) suggests that it may be inappropriate to disclose all possible information to every patient. The doctor is also a leader whom the patient trusts, and the patient may be as disturbed if offered too much, as too little information. Furthermore, when patients are not told, they may be more hopeful for the future and have increased morale, thus

"Knowing the diagnosis can actually relieve fear."

achieving a better quality of their remaining life (Gillon, 1985). Thus, it can be argued that withholding bad news avoids negative effects and may allow positive ones to occur.

Proof that this point of view was reflected in clinical practice is amply demonstrated by a number of surveys conducted during the 1950's and 1960's that asked practising physicians whether they would or did disclose a diagnosis of cancer. These studies indicated that, as noted above, most physicians chose not to reveal a poor diagnosis, and that they believed strongly that this was the correct thing to do (Oken, 1961). Oken found that 90% of his sample did not, as a rule, tell the patient, although almost all believed that a family member should be told. Some doctors used euphemisms such as "a nasty cell", and considered this to be adequate disclosure; others would substitute an incorrect diagnosis

such as "an ulcer". Coupled with this was the belief that the doctor should always hold out the possibility of recovery, to bolster hope. Similarly, a study of Philadelphia doctors (Fitts & Ravdin, 1953) found that 70% of doctors would not give the diagnosis, and Radovsky (1985) summed up the literature, saying that 25 years ago 80% or more of doctors would not give a diagnosis of cancer. The doctors in these surveys generally stated that they based their decision on clinical experience and the fear of the negative consequences that might follow the disclosure.

Opponents of this point of view claim that doctors are reluctant to discuss a diagnosis openly with their patients for other reasons. While it may be ethical to shield people who are unable to accept such information (Brewin, 1985), in practice doctors cannot readily identify those who fall into this category (Radowsky, 1985). Few doctors, and particularly specialists, get to know their patients well enough to judge their desire to be told, or their ability to handle the information (Glaser, 1966; Gillon, 1985). Furthermore, objective criteria for deciding which patients could cope with the information are poorly defined, if at all (Reynolds, Sanson-Fisher, Poole, Harker & Byrne, 1981). It is thus very difficult for the doctor to decide which action, telling or not telling, would do the least harm (Oken, 1961). Reynolds *et al.* (1981) suggest that the communication process be patient centered, in that the doctor allows the patient to decide whether and what he or she be told. This technique eases the problem of reaching a decision.

It has been suggested that other reasons why doctors do not disclose are related more to the well-being of the doctor than of the patient (Radovsky, 1985). Buckman (1984a, 1984b) suggests that doctors are afraid of disclosure, and, therefore, avoid doing so, for a number of reasons. These include fear of being blamed by their patient — since patients are unable to blame themselves for their disease, they may transfer the responsibility to the doctor who brings the news. Furthermore, the doctor may indeed, however irrationally, feel guilty. Doctors are not usually taught how to manage a strongly emotional scene. Finding it difficult to express their sympathy they simply try to avoid such situations. Further reasons include the reluctance of doctors to admit their inability to cure a disease (Krant, 1976). Withholding the diagnosis removes the need to admit to this flaw in their omnipotence, and allows them to remain in a position of power over their patients (Reiser, 1980). Finally, doctors may find discussions about death and severe illness unsettling because it reminds them of their own mortality (Hoy, 1985).

Opponents of withholding a diagnosis also have ethical concerns about this practice. The first of these is that it must be unethical to hold out hope for a cure or recovery when the doctor knows that it is highly unlikely to occur (Reiser, 1980).

Another concern is the patients' basic right to know the truth, both about their life, and about its approaching end (Radovsky, 1985). Withholding the truth from patients places them in a position of childlike dependence on the doctor (Becker & Weisman, 1967). A decision not to tell is overly parental — adult patients should be treated as such, even though they may require a great deal of care as a result of their disease. Furthermore, patients are often the best judge of how to help themselves (Gillon, 1985); Becker and Weisman (1976) suggest that a patient may actually take the news more easily than other family members. It may be better, therefore, to ask the patient whether or not to tell the rest of the family, an interesting reversal of earlier dogma.

"It is the patients' basic right to know the truth, both about their life, and about its approaching end."

The third major ethical concern is the consideration of trust. Many authors have pointed out that the patient frequently suspects the truth, or discovers it accidently from other sources, since withholding a diagnosis is, in practical terms, difficult. Family, other patients and other health professionals often know it, and coordinating all these people to conceal their knowledge is rarely successful (Radowsky, 1985; Reiser, 1980; Souhami, 1978). Often, the type of therapy given to patients supplies a powerful clue as to their diagnosis (Souhami, 1978). If this information contradicts what the doctor has been saying, it can lead to an irreversible loss of trust in the doctor which may be more harmful than the diagnosis itself would have been if frankly disclosed at the outset (Becker & Weisman, 1967). Brewin (1985) suggests that patients trust their doctor and, therefore, may not ask for the diagnosis. However, once the request has been made, the doctor abrogates the right to be trusted if he or she decides to withhold the desired information.

There are other, more positive, reasons to support truth telling. Patients need to adjust mentally and practically to approaching death, for example, by making a new will (Elian & Dean, 1985). Other authors point out that knowing the diagnosis can actually relieve fear, especially with diseases other than cancer (Robinson, 1985). Informed patients tend to do better medically, cope better psychologically, and to comply better with their treatment (Michaels, 1983). Finally, the mainstay of the 'withholders' argument — the loss of hope after being given the diagnosis — has not been objectively supported (Oken, 1961), and many authors have stated that bad reactions and suicide as a result of disclosure

are uncommon (Becker & Weisman, 1967; Henrique, Stadil & Baden, 1980; Michaels, 1983; Radovsky, 1985). In fact, it has been suggested that knowing the diagnosis may actually improve the quality of life, as people actively prepare for their death.

It is clear that there has been a major shift in doctors' attitudes. In 1979, Oken's 1961 questionnaire was submitted to a second sample of doctors (Novack, Plumer, Smith, Ochitill, Marrow & Bennet, 1979) and it was found that 97% of the doctors now favoured telling. The reasons for this change are many and varied. Some of them are related to perceived or actual changes in the desire of patients for information, as media coverage expanded the amount of information available to the public from other sources. At the same time patients began to prefer being actively involved in their treatment (Taylor, 1986). Other reasons included the increasing emphasis on informed consent for treatment, improved prognosis for some cancer patients as a result of better therapy, and increased awareness of death and dying as being a natural and inescapable part of the human condition (Novack *et al.*, 1979; Reiser, 1980).

Other studies have examined lay persons, both sick and well, to determine their attitudes toward being told a serious diagnosis. Less of a change was seen in the population over time, as even the early studies, reviewed by Oken (1961), showed that people had a preference for being told. More recent studies have confirmed and expanded this. The number of patients desiring complete information varies from study to study, but is generally high, for example, 74% (Henriques, *et al.*, 1980) and 83% (Elian & Dean, 1985). The situation is, however, complicated by the fact that many patients suspect their diagnosis before the doctor gives it, and often do not wish their suspicions to be confirmed (Hoy, 1985; McIntosh, 1976). The patients age group may be important, as shown in as a recent study (Cassileth, Zupkis, Sutton-Smith & March, 1980). Most patients wanted to be told all pertinant information, but younger patients preferred to be actively involved in their treatment, while older patients wished to leave much of this responsibility with their doctors. Another difficulty is that the same person may want different amounts of information at different times. Abrams (1966) found that, as the disease moved from treatable to terminal, patients' desire for information decreased. These varying considerations make it essential that doctors be flexible in their communication techniques, and sensitive to verbal or nonverbal signs from the patient.

The final section of this paper is a discussion of techniques used when communicating a poor diagnosis to a patient. Some authors have attempted to objectively examine the techniques that doctors use, others merely discuss their own practices. It has been noted, however, that many doctors use a single technique with no alteration for the individual differences or needs of their patient (McIntosh, 1976; Taylor, 1986), a situation that must surely be less than optimal.

Glaser (1966) suggested that when telling the truth to patients doctors consistently used one of two styles — very abrupt or gradual. The abrupt delivery tended to result in denial, whereas a more gentle delivery made it easier for the patient to accept the news. Taylor (1986) recently took an objective look at the disclosure methods of doctors, and found that the doctors' technique could be predicted by knowing their basic work orientation. She classified doctors as either 'therapists', who focussed mainly on the patient, or 'experimenters' who were primarily interested in the acquisition of clinical and experimental data. The communication technique of either type of doctor generally included three stages. The first was the preamble or the lead in, the second was the confrontation which gave the diagnosis and prognosis, and the third was the diffusion which attempted to soften the blow and focus on therapy. Each doctor used these three stages in their discussions, but only one of four major *types* of discussion with the patient. These four types were (a) communication — the doctor stated the diagnosis; (b) admission of uncertainty — for example as to which therapy is best for breast cancer; (c) evasion — withholding a diagnosis, even to direct questions; and (d) dissimulation — giving a diagnosis and/or prognosis that was incorrect. Taylor (1986) noticed a clear distinction between the therapists and the experimenters with respect to their type of discussion. The therapists were much more likely to use evasions and euphemisms; the experimenters tended to be more open, although abrupt.

When discussing techniques, a number of authors stressed the need to have a plan before starting the discussion, and to deliver the information slowly. It may be necessary to repeat it several times, since the patient may not be able to absorb all the news, let alone its implications for the future, at the first hearing (Becker & Weisman, 1967; Michaels, 1983; Radovsky, 1985). Talking with the patient should not be seen as a single event, but rather as a process of ongoing communication with the doctor giving more information to the patient as it is asked for (Becker & Weisman, 1967). It was also considered important to let the patient control the quality and quantity of information received (Michaels, 1983), and to accept that the patient may make a decision to know nothing. Patients certainly have this right, but it must be their decision, not made for them by the doctor. The presence of the family may also be a positive support for the patient, as well as decreasing the number of times it is necessary to repeat the information (Michaels, 1983).

Radovsky (1985) recommends that the doctor talk *with* and not *to* the patient, and to be prepared to repeat the information as often as is necessary. Use of as little jargon and technical language as possible is important — they may impress, but are more likely to confuse the patient. Radovsky also recommends that the doctor let the patient be in charge of the discussion, and that the doctor be matter-of-fact and limit expressions of sympathy, which may serve to emphasize the differences between her or him and the patient. Finally, the doctor should not be to afraid to admit ignorance of the exact prognosis, or of future symptoms that the patient might develop; the doctor should say only what is actually known.

An excellent technique for teaching students in any of the health care related professions how to talk with patients on these topics has been developed by Dr. Robert Buckman (1984b). He has produced a series of programs on videotape which cover the various aspects if this skill. Emphasis is placed on making the patient comfortable, finding out what the patient already knows, and what he or she wants to know, giving the bad news, dealing with emotion, and identifying common mistakes that physicians make when involved in such a discussion.

Before even beginning to talk, it is important to make sure that the setting of the interview is such that it affords the maximum of privacy and comfort to the patient. The second stage of the discussion is to determine what the patient knows or has guessed about the diagnosis. Patients often have a closer idea of the truth than the doctor realizes, and when this is the case it can make the process of revealing the diagnosis easier. If the patient does not already know, the doctor should ask for a clear indication that the patient is willing to be told, for example, by asking "if the lab result showed a serious problem, are you the sort of person who would like to know?". When giving the information, it is important to tailor the process to the individual, by following the patients responses, and ensuring that they do understand what they are being told. If the patient cries, it is better to allow them to do so than to be overly reassuring, and to find out why, so any particular fears can be addressed. A similar procedure works with anger — the doctor acknowledges the anger and tries to explore the reasons for it, without becoming angry and defensive in turn, which is liable to end the interview prematurely.

Dr. Buckman stresses that these guidelines are just that — no one technique will be correct in all situations, and every doctor, or other professional, will make mistakes at times. However, certain mistakes can be avoided if the doctor is aware of them. The first such mistake can occur when the doctor backs away from the patient by using distancing tactics, such as beginning to talk about the specific lab reports, rather than continuing to listen to the patient's concerns. A second mistake can occur when the patient shows emotion, for example, by crying, in reaction to the news. The doctor attempts to reassure the patient and stop the crying. This action, however, is often premature and ineffective — it is better to allow the patient to cry, and afterward reassure them that such feelings are normal and common. Similarly, telling patients not to worry after they have been given the news is a mistake. Patients will worry, and telling them not to is not only ineffective, but also denies them the opportunity to talk about the fear. The doctor, therefore, looses the opportunity to reduce specific fears that they might have. Finally, a common mistake that doctors make is ignoring cues from the patient about the social and psychological concerns that they have. Doctors tend to follow their training and focus on the physical aspects of disease, but this can result in patients having serious problems that are not being addressed.

In summary, this paper has discussed breaking bad news to patients. The longstanding belief that patients should not be told because of the harm this would do has changed. Doctors have come to realize the ability of their patients to cope with bad news, and also have realized the negative effects, such as loss of trust, that withholding the diagnosis can have. The techniques that help doctors to disclose a negative diagnosis to their patients have also been discussed, but, as with all aspects of medicine, there is no substitute for actual experience with patients. It is to be hoped that appropriate teaching in medical school will equip young doctors with the insight to respond to patients nonverbal cues and unasked questions, and the technique to discuss their life threatening illnesses with the minimum of unnecessary stress.

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Infection and Disease due to The Human Immunodeficiency Virus

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Introduction

The acquired immune deficiency syndrome (AIDS) was first recognized as a clinical entity in the summer of 1981, when unexplained cases of *Pneumocystis carinii* pneumonia and Kaposi's sarcoma were diagnosed in homosexual men in Los Angeles and New York City.[1] By May 1983, a new human retrovirus was identified as a cause of AIDS.[2 3] This virus is now termed human immunodeficiency virus (HIV).[4] The discovery of HIV rapidly led to the development of serological tests to detect evidence of viral infection. As a result, it is now possible to formulate a much clearer picture of the epidemiology of HIV infection and the natural history of chronic infection due to this virus. As well, a number of closely-related human and simian retroviruses have recently been found in Africa.[5 6] It is now believed that the first cases of AIDS occurred in Central Africa in the early 1970's, possibly as a result of a major mutation of a simian retrovirus which permitted its adaptation to the human host.

The Virus & Pathogenesis of Infection

HIV is a member of the family of human retroviruses. These enveloped RNA viruses possess a reverse transcriptase (RNA-dependent DNA-polymerase) that enables the virus to insert its proviral DNA into the chromosome of the host cell. The molecular structure of the virus has been fully elucidated and it appears that its genome is most closely related to the lentiviruses, such as the visna virus.[7] The genome is organized into 3 major replicative regions, referred to as the *gag*, *pol* and *env* genes. The *env* gene codes for the production of viral envelope glycoproteins (e.g. gp41, gp120) and is subject to considerable genetic variation. The *gag* gene codes for the production of core viral proteins (e.g. p24). The *pol* gene is believed to code for gene products necessary for the insertion of the viral genome into the host cell chromosomal DNA.

In addition, these viruses contain at least 4 additional genes: *sor*, *tat*, *3'-orf* and *art*. Of these the *tat* (*trans* activator gene) encodes for the production of a trans-activating protein that greatly stimulates the transcription of the replicative genes and is critical for virus replication, modulating the expression of the *gag* and *env* proteins. The functions of the gene products of *sor* and *3'-orf* are unknown.[8]

HIV binds to T4 receptors and can infect all cell types that carry the T4 receptor on their surface. The best characterized is the observation that it is lymphotropic for the helper/inducer subset of $T4^+$ lymphocytes [9], although only a small proportion are infected with HIV at any one time. The virus also infects cells of the monocyte/macrophage lineage such as blood monocytes and macrophages, Langerhan cells in the skin, lung macrophages, brain macrophages and follicular dendritic cells in lymph nodes.[10].

HIV is cytopathic for the cells which it infects and characteristically depletes the helper/inducer subset of $T4^+$ lymphocytes. The formation of multi-nucleated giant cells that produce a large amount of virus and then die over a period of a few days is a characteristic manifestation of the cytopathology induced by this virus.[11] As a result, the major *primary* injury induced by HIV is to $T4^+$ lymphocytes, brain and lymph nodes.

Host Immune Response to HIV Infection

Most of the gene products of HIV are able to induce the formation of specific antibodies. Antibodies against the *gag* gene products (core proteins, p17, p24, p53) and the envelope glycoproteins (gp41) are used to detect evidence for infection by HIV and form the basis of serological tests by ELISA and the Western blot (WB) technique.[12] These antibodies usually are detectable within 2-3 months of infection by HIV.

Despite a large number of specific antibody responses to infection by HIV, only a few appear to have potential for neutralizing the virus. Antibodies that bind to the external envelope glycoprotein gp120 appear to prevent viral infection *in vitro* but their role in protection against viral infection in humans awaits further study.[13]

The role of cellular immune responses in controlling infection by HIV is only starting to be elucidated. Recently, lymphocytes bearing the CD8 marker were shown to suppress replication of HIV in peripheral blood mononuclear cells.[14]

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Serological Tests for HIV Infection

The enzyme-linked immunosorbent assay (ELISA) is now well established as a screening test for antibodies to HIV. The sensitivity of the test is at least 97% (i.e. less than 3% false negative) and its specificity is 99.8% (i.e. only 0.2% of uninfected sera were falsely positive). Nevertheless, in low-prevalence groups, the positive predictive value of the ELISA test is low.[15] The ELISA test may also lack sensitivity in early HIV infection.[16]

It is current practice to confirm all positive ELISA tests by a test such as Western blot or indirect fluorescent antibody testing (IFA). The specificity of these tests is believed to be almost 100%.[15]

A reactive ELISA and confirmatory test can now be confidently interpreted as indicative of HIV infection. A single HIV culture by current methods will yield virus in 30-70% of the blood from these seropositive individuals. Thus a seropositive individual is not only infected but also potentially infectious and thus capable of transmitting virus. At this time, the procedure for isolating HIV is prohibitively complex and expensive for use as a routine diagnostic method. There are some early reports of assays to detect HIV-antigen in blood.[17]

Epidemiology of HIV Infection

Transmission of HIV, has been documented to occur through one or more of 4 modes: sexual contact, exposure to blood contaminated needles, administration of infected blood or blood products, and passage of the virus from infected mothers to their newborns. Although the virus can be isolated from several bodily fluids, it can be most readily recovered from semen, peripheral blood mononuclear cells, cervical-vaginal secretions and nervous tissue and cerebrospinal fluid. Casual and household contacts are not at risk.

In North America and Europe, the largest number of infected individuals are homosexual men or intravenous drug abusers and the male to female ratio is 16:1. In contrast, in Africa, HIV infection is transmitted heterosexually and the male to female ratio among cases is 1:1. The major risk factor for infection is the number of different sexual partners, having sex with prostitutes, and a history of other sexually-transmitted diseases.[23]

It is now estimated that several million people worldwide have been infected with HIV. The prevalence of infection in high risk groups such as active homosexual men in such urban centres as San Francisco, hemophiliacs and i.v. drug abusers in New York City exceeds 50%. The prevalence rates in healthy blood donors in the United States is 0.4 per thousand and in Canada 0.2 per thousand. A recent study of U.S. military recruits showed a prevalence of 1.5 per thousand.[24] In Central Africa, from 1-18% of healthy blood donors and pregnant women and as many as 27-88% of female prostitutes have antibodies to HIV.[23]

From this pool of chronically infected individuals will emerge the case load of patients with AIDS. The Centers for Disease Control estimate that 10-30% of those infected will develop AIDS in the next 5-10 years. By the beginning of 1987 almost 30,000 cases of AIDS had been reported in the United States since 1981, a third (13,000) of those during 1986. In Canada, 835 cases had been reported as of January 12, 1987. Of these, 310 have been from Ontario. In 1986, 143 cases were reported from Ontario, only slightly more than the 125 reported the year earlier. In Ontario, over 90% of cases have occurred in homosexual men and 75% of these men live in metropolitan Toronto.

Initial surveillance studies in Central Africa suggest an annual incidence of AIDS of 550 to 1000 cases per million adults.[23]

Although estimates vary, biostatisticians have projected at least 102,000 new cases of AIDS in the United States between 1986 and 1991[25]; some projections are as high as a total of 270,000 cases by 1991.

Natural History of Infection Due to HIV

There is now conclusive evidence that in 50-70% of individuals infected by HIV, the infection becomes chronic. The evidence for this is based on serial ability to grow the virus from peripheral blood mononuclear cells in both asymptomatic and symptomatically infected individuals and the natural history of infection due to this virus. Cohorts of asymptomatic seropositive individuals followed for a period of up to 5 years show a progressive transition to symptomatic forms of infection (i.e. disease) due to this virus.[18 19 20] In the San Francisco cohort study, 10% of all subjects followed for 5 years after the onset of infection (as measured serologically) have developed AIDS.[18] Cohorts of patients with persistent generalized lymphadenopathy demonstrate a 2.3-11.4% (mean 7.3%) per year incidence of AIDS over observation periods of 2 to 4.5 years.[21]

From these data has evolved a concept of HIV infection as a *chronic viral infection* of predominantly $T4^+$ lymphocytes and brain macrophages. Host factors modulate this infection but over a period of time, there appears to be a *cummulative* injury to the infected cells that may eventually result in disease outcomes such as AIDS. The minimum duration of infection before the disease outcome of AIDS is about 2 years.[20]

Classification system for HIV Infection

Recently, the Centers for Disease Control has suggested a system for classifying patients diagnosed as having HIV infection by either serological testing or viral isolation. This system is summarized in table 1.[22]

GROUP I. Acute HIV Infection. Defined as a mononucleosis-like syndrome, with or without aseptic meningitis, associated with seroconversion for HIV antibody.

GROUP II. Asymptomatic HIV Infection. Defined as absence of symptoms or signs of HIV infection. These patients may be subdivided into those with normal laboratory tests and those with such HIV-associated abnormalities as lymphopenia, thrombocytopenia and decreased numbers of $T4^+$ — lymphocytes.

GROUP III. Persistent Generalized Lymphadenopathy (PGL). Defined as palpable lymphadenopathy (lymph node enlargement of 1 cm or greater) at two or more extrainguinal sites persisting for more than 3 months

Table 1
Summary of classification system for HIV infection

Group I.	Acute infection
Group II.	Asymptomatic infection
Group III.	Persistent generalized lymphadenopathy
Group IV.	Other disease
Subgroup A.	Constitutional disease
Subgroup B.	Neurologic disease
Subgroup C.	Secondary infectious diseases
Category C-1.	Specified secondary infectious diseases listed in the CDC surveillance definition for AIDS*
Category C-2.	Other specified secondary infectious diseases
Subgroup D.	Secondary cancers*
Subgroup E.	Other conditions

* Includes those patients whose clinical presentation fulfills the definition of AIDS used by CDC for national reporting.

in the absence of any other concurrent illness to explain the findings.

GROUP IV. Other HIV Disease. The clinical manifestations of patients in this group are subdivided into 5 subgroups designated A to E.

SUBGROUP A. Constitutional Disease. Defined as one or more of the following: fever persisting for more than 1 month, involuntary weight loss of greater than 10% of baseline or diarrhea persisting more than one month.

SUBGROUP B. Neurologic Disease. Defined as one or more of the followings: dementia, myelopathy or peripheral neuropathy.

SUBGROUP C. Secondary Infectious Diseases. Defined as the diagnosis of an infectious disease associated with HIV infection and/or at least moderately indicative of a defect in cell-mediated immunity.

Patients in this group are divided further into two categories:

Category C-1. Includes patients with symptomatic or invasive disease due to one of 12 specified secondary diseases listed in the surveillance definition of AIDS: *Pneumocystis carinii* pneumonia, chronic cryptosporidiosis, toxoplasmosis, extra-intestinal strongyloidiasis, isosporiasis, candidiasis (esophageal, bronchial, pulmonary), cryptococcosis, histoplasmosis, mycobacterial infection with *Mycobacterium avium* complex or *M. kansasii*, cytomegalovirus infection, chronic mucutaneous or disseminated herpes simplex virus infection and progressive multifocal leukoencephalopathy.

Category C-2. Includes patients with symptomatic or invasive disease due to one of six other specified secondary infectious diseases: oral hairy leukoplakia, multi-dermatomal herpes zoster, recurrent Salmonella bacteremia, nocardiosis, tuberculosis or oral candidiasis (thrush).

SUBGROUP D. Secondary Cancers. Defined as one or more kinds of cancer known to be associated with HIV infection and at least moderately indicative of a defect in cell-mediated immunity: Kaposi's sarcoma, non-Hodgkin's lymphoma or primary lymphoma of the brain.

SUBGROUP E. Other Conditions in HIV Infection.

Once the patient's illness fulfills the CDC case definition for AIDS (group IV, subgroups C-1 and D), the median survival is of the order of 8-9 months and very few patients survive longer than 2 years.

Treatment & Prevention of HIV Infection

As a result of the rapid accumulation of knowledge about the molecular biology of HIV, candidate subunit vaccines are currently being evaluated. Both gp41 and gp120 may have neutralizing epitopes and are potential vaccine antigens. However, genetic variation within the *env* gene may limit the potential of the strategy.[26]

Because the HIV-genome persists in close association of the host chromosomal DNA, viral eradication may prove difficult and prolonged suppressive antiviral chemotherapy may be necessary to control this virus.[26] A number of candidate anti-viral drugs have been evaluated in human clinical trials. Of the currently evaluated drugs, azidothymidine (AZT), a potent competitive inhibitor of HIV reverse transcriptase, appears to have the greatest promise. In an early placebo-controlled trial in patients with *Pneumocystis carinii* pneumonia (PCP) and AIDS, treatment with AZT resulted in significantly lower short term mortality. This drug is now available in Canada for the compassionate treatment of patients with a history of PCP and AIDS. It is also being evaluated in patients with group III and group IV, subgroup A infections. Anemia appears to be an important short term side effect and its long term safety is not known.[27]

Major efforts are underway to educate the public about the modes of transmission of HIV and ways of minimizing this possibility. Advocacy of monogomous sexual relationships and the use of condoms is central to these programs.[28]

The risk of transmission of HIV to health care

workers appears to be very low. Nevertheless, there is no question that HIV infection can be acquired from "needle-stick" injuries, although the incidence appears to be much less (<1%) than the risk of hepatitis B.[29] Although a number of infection control practises can prevent transmission of HIV to health care workers; the most important is to use extra-ordinary care to prevent accidental puncture injuries from sharp, blood-contaminated items such as needles and scalpels.

Since November 1985, the Canadian Red Cross has routinely tested all donor units for evidence of HIV infection. This practise should virtually eliminate transfusion-associated HIV infection.

Summary

HIV infection can be acquired from sexual contact or direct exposure to blood from infected individuals as well as by infants born to infected mothers. This human retrovirus has a unique tropism for $T4^+$ receptors on lymphocytes as well as macrophage/monocytes, especially in brain and lymph nodes. The acute infection results in the development of specific antibodies which can be detected by either ELISA or Western blot. Neutralization of the virus by the host's immune system is usually not possible and the majority of individuals become chronically infected. The natural history of this chronic virus infection over a period of years may range from asymptomatic infection to disease outcomes such as persistent generalized lymphadenopathy, chronic constitutional disease (fever, weight loss, diarrhea), neurological disease (dementia, myelopathy) to AIDS associated opportunistic infections and secondary cancers such as Kaposi's sarcoma. The 5 year risk of AIDS appears to be about 10%. Effective vaccines and anti-viral drugs have not yet been developed, although some progress has been made in this area. Public education about HIV infection and its prevention may be the most effective strategy for the immediate future.

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Seizures and Intracerebral Hemorrhage of Unknown Etiology

*Janis M. Miyasaki 8T8, W.S. Tucker, M.D., F.R.C.S.(C)**

A 21 year old male, M.C., presented to the emergency department after experiencing his first seizure. The seizure was witnessed by his mother and began as repetitive right arm movements during which he was unable to speak clearly. This progressed to a generalized tonic-clonic seizure. There was no incontinence of bladder or bowel.

Previous to the seizure, M.C.'s mother had noticed that he had difficulty speaking clearly. M.C. was a university student at the time and reported no difficulty with concentration, thought process or memory. The only notable finding in family history was a grandfather who had died of a massive hemorrhage due to a benign intracranial tumour.

On examination, M.C. was oriented and able to follow commands. His speech was assessed as normal. B.P. was 110/80. No cranial or neck bruits were present. Cranial nerve examination was normal - notably, pupils were equal and reactive to light and fundoscopic examination was normal. On motor examination, bulk, tone and power were normal. M.C.'s deep tendon reflexes were 2+ throughout with flexor plantar responses. Gait and stance were normal.

Special tests performed included a CT scan of the head, plain and with contrast administration (Fig. 1). This demonstrated a left parietal lesion extending to the left lateral ventricle. The lesion showed signs of calcification. There was obstruction of the left temporal horn and minimal midline shift was seen.

Angiography was performed one month later. This disclosed an occult bilobed small left carotid termination aneurysm but no evidence of a vascular lesion in the parietal area. Following the angiogram, the patient had a generalized seizure.

EEG showed focal slowing in the left temporal leads (theta and delta activity) with sharp waves in the same area on hyperventilation.

Due to the location of the mass in an eloquent area, it was decided not to biopsy the lesion and instead to manage the patient on medical therapy for seizure control. He was started on phenytoin 100 mg t.i.d.

During the following year however, the patient had approximately six generalized tonic-clonic seizures. Thirteen months after his first presentation to hospital, he had a generalized tonic-clonic seizure followed by a severe left frontal headache radiating to his left eye. His

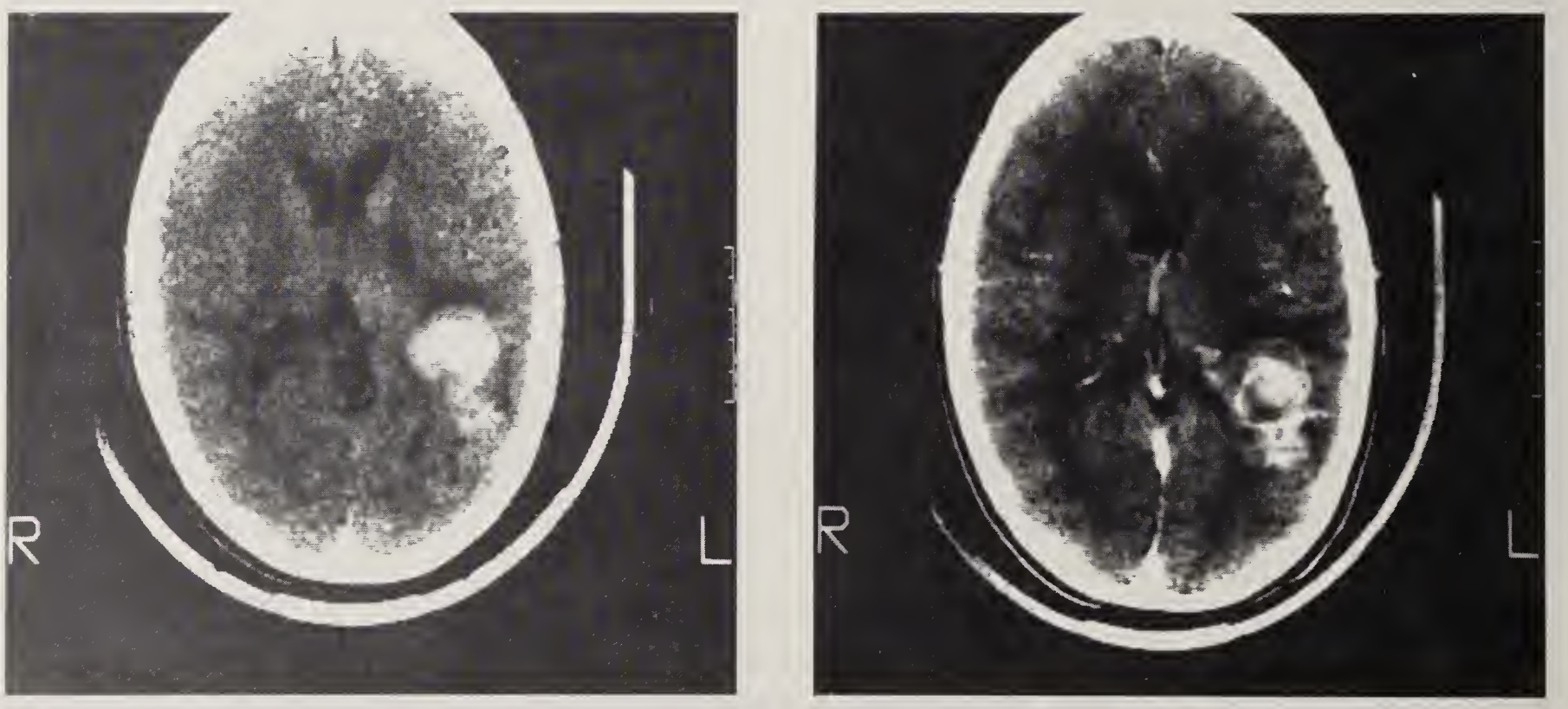

Figure 1: CT scan without contrast (left) and with contrast medium administration (right) demonstrating a left temporoparietal radiodense lesion. The enhancement of the lesion with intravenous contrast medium administration indicates that the lesion is hemorrhagic.

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neck was slightly stiff and he noted a decrease in memory. He was admitted to hospital for further investigation.

On examination, M.C. was alert and oriented. Neurologic examination was normal. On lumbar puncture, the CSF was clear and colourless but CT scan of the head showed evidence of a recent hemorrhage in the temporoparietal area. Carotid and vertebral angiograms were still negative for a vascular lesion in the temporoparietal region.

What is your differential diagnosis?

Differential Diagnosis and Explanation

The commonest causes of seizures of adult onset are trauma, neoplasm, infection, vascular and degenerative disease. On the basis of the CT scan of the head, the lesion must be hemorrhagic. The tumours that fulfill this criterion and are compatible with the other clinical features of this patient are mainly low grade gliomas (oligodendroglioma or astrocytoma). A thrombosed arteriovenous malformation is less likely.

Treatment

Because of the possibility of massive intracerebral or intraventricular hemorrhage, surgery was performed to obtain a definitive diagnosis and if possible, cure of the lesion by removal.

The operation was performed with the patient awake. Under local anaesthetic, a bone flap was raised, the dura anaesthetized and reflected. A brain needle was used to locate the area of hemorrhage. Upon encountering the lesion itself, brain margins were easily identified. The quick section revealed sclerosis, fibrosis and an old hemorrhage. However, further exploration revealed dilated venous channels with evidence of recent hemorrhage. An extensive vascular malformation was completely removed. A pathologic diagnosis of cavernous angioma was made. Throughout the entire operation, the patient conversed with the surgical staff and post-operatively was able to move all four limbs by command. Approximately one year later, the left carotid termination aneurysm was clipped prophylactically, without incident.

Discussion

The patient's symptoms were due to a cavernous angioma, a subtype of vascular malformations. The other blood vessel hamartomas are capillary telangiectasia and venous and arteriovenous angioma or malformation (AVM). Although the cavernous angioma is thought to be rare, its incidence is perhaps underestimated since it is usually angiographically cryptic, as in this instance.

Cavernous angiomas are congenital in nature, although their exact etiology is unclear. The commonest site of cavernous angioma is the cerebrum, especially the Rolandic fissure, basal ganglia and the wall of the third ventricle. Lesions in the pons are also common.

Macroscopically, the lesion is well circumscribed and lobulated. Its colour and surface have been likened to a mulberry[1]. In size, the cavernous angioma varies from a few millimeters to several centimeters[2]. It often contains fine fibrous strands and within the vessels, there is frequently thrombosis and calcification. Microscopically, there is no capsule surrounding the lesion and no neural tissue is contained within the lesion. This feature differentiates the lesion clearly from an AVM, in which there is abnormal neural parenchyma amongst the vessels. The walls of the vessels are made up of collagen, lined only by a single layer of endothelium and no muscle or elastic laminae are seen[1]. Notably, the feeding artery and draining vein are small. This, in part, accounts for its radiographic silence[2].

Angiographically silent vascular malformations include cryptic AVM's, cavernous angiomas and capillary telangiectasia. Cryptic arteriovenous malformations are also commonly supratentorial. Their cryptic nature is due to their small size or vessel thrombosis[3]. Conversely, the lack of angiographic findings in cavernous angiomas is explained by the presence of stagnant sequestered blood in these low flow lesions and the high density of the lesion due to blood and calcium deposits. Additionally, differentiating cavernous angioma and other cryptic vascular malformations from low grade glioma on the basis of CT scan alone is difficult[2].

The commonest presentation of the cavernous angioma is a seizure. Intracerebral hemorrhage is a less common presenting feature[2]. Since the time of Dandy, seizure has also been recognized as the classic presenting symptom of arteriovenous malformations[4].

The indications for surgical excision of cryptic vascular malformations include the necessity for histologic diagnosis, prevention of further bleeding and improved control of seizures. Since the differential diagnosis in M.C.'s case included AVM and cavernous angioma, as well as low grade glioma, each of these lesions had to be considered. Interestingly, oligodendroglioma, one type of differentiated glioma, is associated with frequent calcification and spontaneous hemorrhage.

The risk of surgery is relatively low since excision of cavernous angiomas is performed with minimal bleeding and minimal tissue disruption. Removal of the cavernous angioma may lead to resolution or improved control of seizures. Additionally, the risks of morbidity and mortality in the presence of an acute hemorrhage are sufficiently high that surgery is in fact, a conservative treatment.

Following his surgery, the patient had a slight speech impairment noticeable only to himself and his family. He completed his university degree and is currently doing graduate research.

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The Evolution of Medical Illustration

Kerri Weller, AAM 8T7

Muscle-figure by Andreas Versalius (1513-1564) from his atlas: ***De Humani Corporis Fabrica.***

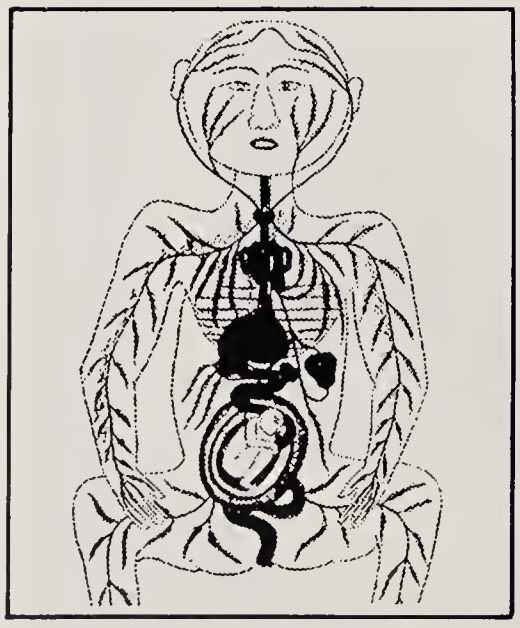
This collection of pictures highlights works included in an exhibit on the history of medical illustration. The objective of the exhibit is to provide an overview of medical illustration from its earliest known origins through to its latest developments, and to trace the establishment of medical illustration in Canada.

The primary purpose of medical illustration has remained unchanged from antiquity: to communicate in the service of medicine. Throughout recorded history, drawings, paintings and sculpture have served to convey both the observed realities and unobserved intangibles of medical science, many of which could not be understood in words alone. In 1510, Leonardo da Vinci wrote: "Dispel from your mind the thought that an understanding of the human body in every aspect of its structure can be given in words; for the more thoroughly you describe, the more you will confuse: it is therefore necessary to draw as well as to describe". From the pioneering work of Leonardo da Vinci and his predecessors in medical and scientific illustration, specialized artists have evolved, with backgrounds combining both art and medicine. They can depict with accuracy and clarity the latest in scientific and medical information. Today, a medical artist is a professional artist who has received biomedical training at a university level. The visual aids they produce assist research and disseminate current medical knowledge. The demand for their work is ever-increasing as the fields of science and medicine continue to expand at a phenomenal rate. Medical art, once chiefly the preogative of the scientific and medical community is now in everyday use by patients and the general public alike for education, training and communication.

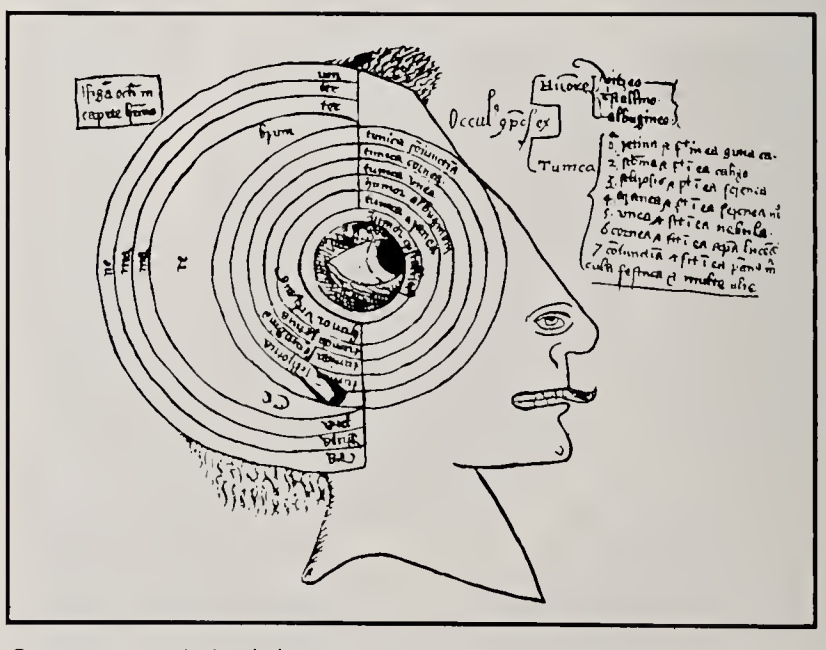
The exhibit was conceived and executed by Kerri Weller, a student of medical illustration at the University of Toronto, as a summer studentship project with the Hannah Institute for the History of Medicine. It was supervised by Professor Steve Gilbert, Department of Art as Applied to Medicine of the University of Toronto, and edited by Robin J. Miller.

The exhibit was made possible by the generous support of the Hannah Institute for the History of Medicine and the Department of Art as Applied to Medicine, University of Toronto.

ORIGINS ? — 2 A.D.



The arterial system of a pregnant woman, from a Persian manuscript of about 1400 A.D. This figure is one in a series of related schematic figures believed by Ludwig Choulant to have originated from drawings produced in ancient Greece. Medical drawings of antiquity survived through the dark ages by such Arabic, Syrian and Persian copies.



Cross-section of the head, depicting schematic eye, from a 14th century manuscript. In the centre is the eye with 6 concentric layers. To the left, 3 layers represent the brain's coverings.

THE LATE MIDDLE AGES — 1050-1500

The spread of Christianity throughout Western Europe severely curtailed medical and scientific inquiry after about 400 A.D. It was not until the 11th century, inspired in part by copies of ancient manuscripts now filtering back to Europe from the East, that a revived interest in learning arose, accompanied by a gradual refocusing of attention on medical science. The period between 1050 and 1450 saw the founding of many universities and schools of medicine. Based entirely on dogma at first, these schools turned to theories of empirical learning as the restrictive teachings of the Church were slowly supplanted. Direct observation and investigation of the human body led to a far greater understanding of its structure and function and this, coupled with the 1450 invention of printing with movable type, marked the beginning of a period of rapid development in medical illustration. Multiple copies of woodcuts were now in great demand to accompany printed texts, replacing the laboriously created, single illuminated manuscript illustrations of the past.

Genre scene depicting bloodletting by a snake. Woodcut from H. Brunschwig, ***Buch der Cirugia****, 1497*

"The Zodiac Man": He is surrounded by the signs of the zodiac pointing to the parts of the body the various signs were thought to govern. Woodcut by Francois Jollat of Paris, 1535.

Bloodletting was performed as a therapeutic remedy for many illnesses in the Middle Ages. Charts with venesection figures were hung in baths where treatment was performed, acting as guidelines to the location of veins for the uneducated barber-surgeons.

THE RENAISSANCE — 1540-1600

A concerted impulse to study human anatomy was not only to come from the physicians and anatomists but also from the great artists of the Renaissance. These artists strove to depict the beauty of the human form in an accurate and realistic manner and pursued the study of the human body, including cadaver dissection, to gain direct knowledge and understanding of human anatomy. The Renaissance artists freed themselves of the conventional, rigid forms of depiction which characterized the Middle Ages and approached nature afresh, with keen observation and a passion for realism.

A Fornix, psalloides, corpus comeratum.
B Principiũ vermiformis circa septũ, anteriores ventriculos distinguens.
C Conarion glandula.
D Vermiformis longitudo.
E Glutia. ligamẽta et ptes adiacẽtes vermiformi.
F Via à tertio ventriculo ad quartum.

One of a series of woodcuts engraved by Francois Jollat, depicting the dissection of the brain. From the anatomical work of Charles Estienne (1504-1564), ***De dissectione partium corpori humani libri tres.***

Estienne, a French anatomist is rather more infamous than famous. He is best known for one large, illustrated text on anatomy that provoked these comments from modern scholars: "The plates of Estienne have the distinction of being without a doubt the most hideous ever published..."; "The ugliest anatomical work that we know ... wholly devoid of grace or beauty." But, regardless of either their intrinsic or extrinsic artistic merit, Estienne's plates did serve to influence a far greater talent, Vesalius.

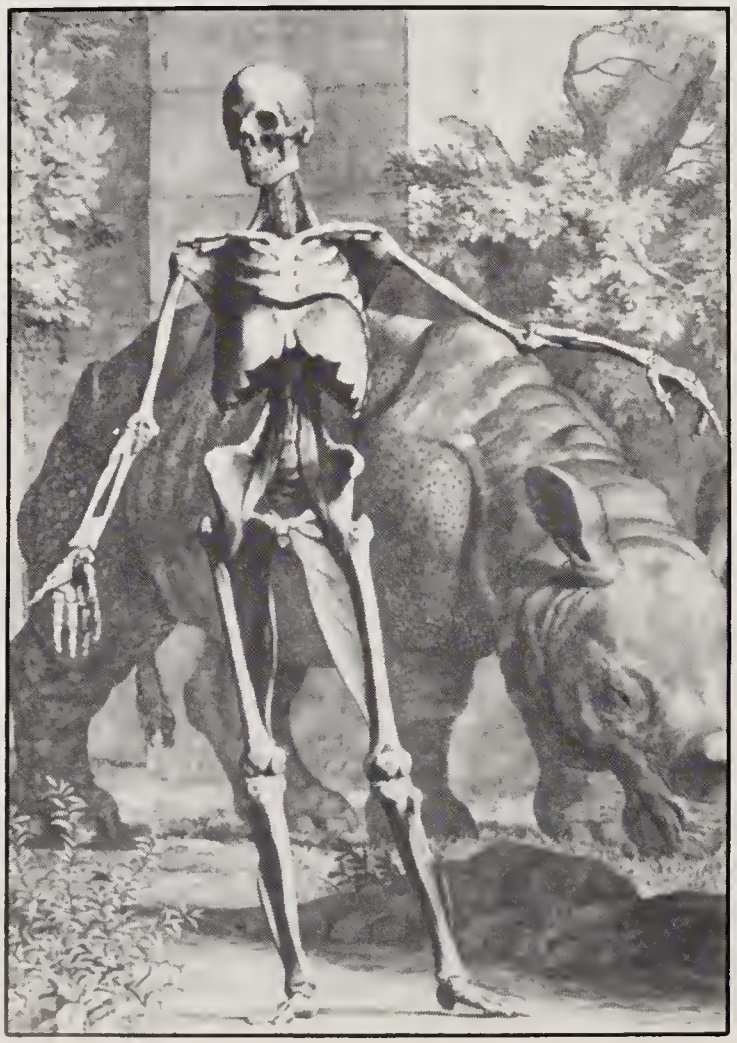
THE RENAISSANCE — 1540-1600

Flayed muscle-man, shown holding his skin in one hand while grasping the knife with which he performed the operation in the other. It is a copper plate engraving by Juan de Valverde, from ***Anatomia del corpo humano****, Rome, 1560.*

Valverde was one of the most successful imitators of Vesalius. Although it contained a number of highly original illustrations, Valverde's principle work, a manual on anatomy, contained many illustrations directly copied from Vesalius with only minor additions or changes. In the foreword to the text, Valverde justifies his decison to copy or imitate Vesalius by implying that he thought it would be seen as a case of jealousy had he disregarded the other man's manuscript; it was easier for him to improve his rival's work than to ignore it. Valverde's smaller text enjoyed great popularity when it proved cheaper to print and easier for the reader to use than the fabrica.

THE 17TH & 18TH CENTURIES

The intellectual climate of this period favoured cold scientific research rather than the ardent artistic vision of the Renaissance. Medical illustration moved toward greater exactness in all detail. In the field of printing, the copperplate engraving replaced the woodcut and provided finer detail with almost pin-point accuracy. Colour copperplate prints of anatomical subjects were attempted for the first time. In the field of medicine, the modern specializations of pathology, histology, physiology and surgical anatomy began their rise.



Copperplate engraving of muscle-mannikin drawn by Jan Wandelaar, for Bernhard Albinus' (1697-1770) anatomical atlas. ***Tabulae Sceleti et Musculorum Corporis Humani****, Leyden, 1747. When the first rhinoceros arrived in Europe in Amsterdam in 1741, both Albinus and Wandelaar immediately proclaimed it to be the symbol of The Atlas and thus it appears in the background scenarios.*

Albinus has been called the greatest anatomist of the 18th century. The major works of Albinus, the culmination of 20 years of research, are two anatomical atlases which concentrate on the skeletal and muscular structure of the body. The accompanying illustrations by Dutch artist Jan Wandelaar (1690-1759), are extraordinary in their accuracy, skill and grace. He depicts each muscle and bone whole, in detail, and in relation to one another.

THE 17TH & 18TH CENTURIES

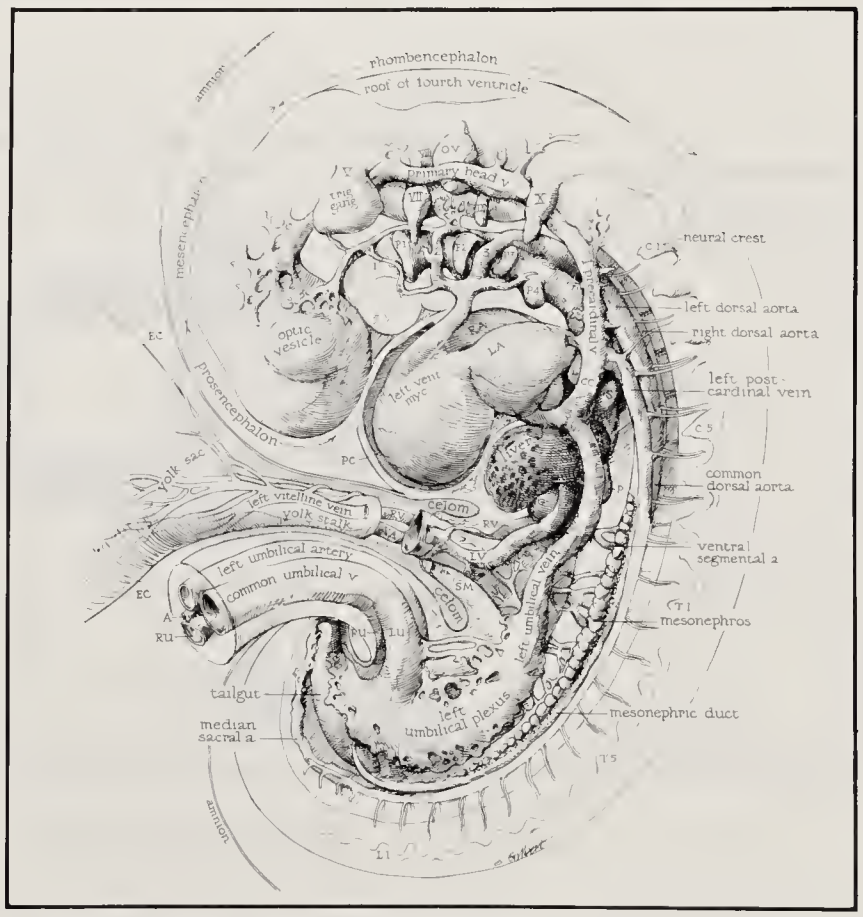
Copperplate engraving of the fetus in the womb by Guilio Casserio (1561-1616), published in Spegelius, ***De formate Foetu****, Padua.*

Casserios' illustrations are among the finest examples of 17th century copperplate engravings of anatomic subjects. Their high standard of accuracy, technical excellence and elegant composition set a model for the illustration of anatomy using copperplate engraving. For the next 150 years, this technique was used almost exclusively for the reproduction of medical illustration.

THE 20TH CENTURY

The end of the 19th century was a brilliant period of invention and discovery. Modern medicine moved with increasing speed toward its goal of a well-organized, fully accurate body of knowledge. Significant advances in medical illustration were prompted by radical innovations in the processes of reproduction including lithography, wood, steel and photo engraving. Economical mass reproduction resulted in a tremendous growth in the number of publications. Improved printing techniques made even colour printing available to any publication with reasonable circulation. Scientific and medical publications used illustrations extensively for the first time, and thus created a demand, a need, for artists with medical training. In response, Johns Hopkins University founded the first program for the specialized education of medical artists, its director: Max Brödel.

Multinodular myomatous uterus by Max Brödel, 1908. In 1911 Brödel pioneered the first program for the training of medical illustrators at Johns Hopkins University, Department of Art as Applied to Medicine.



4 mm human embryo from a series of illustrations by Stephen Gilbert for ***Pictorial Human Embryology****, now in production at The University of Washington Press, Seattle.*

The exhibit opened November 12, 1986, for a two-month period at the Museum of History of Medicine, Academy of Medicine, Toronto. It will also be displayed during 1987 at the following locations on the University of Toronto, St. George Campus:

February 9
March 27 — Robarts Library
Main Display Area
130 St. George Street

April 11 — Faculty of Medicine Open House
Medical Sciences Building
1 King's College Circle

May 7, 8 & 9 — Department of Art as Applied to Medicine Open House
256 McCaul Street

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The Art and Science of Clinical Medicine

Every medical student, clinical clerk, or intern soon comes to realize that there is no substitute for learning from clinical experience. One also appreciates that the accomplished clinician with many years of experience has developed a repertoire of practical ideas which are rarely found in textbooks. Beginning with this issue, we will devote a section to 'Clinical Medicine' and we invite our readers to share their experience. Please send your ideas, techniques, or correspondence to the University of Toronto Medical Journal, Suite 2141, Medical Sciences Building, Toronto, Canada, M5S 1A8.

We would like to thank the clinical teachers at the University of Toronto for the following contributions.

The Editors

McWiley's Test

During examination of the shoulder, information may be derived by having the patient sit on a STRAIGHT-BACKED Chair. The examiner takes the affected arm to 90° abduction at the shoulder and flexes the elbow. When humerus is pushed into the glenoid fossa, a torn labrum will often give a CLICK. (The manoeuvre resembles McMurray's Test in the case of the knee). I have called this McWiley's test!

Also in this position, if the patient sits close to the back of the chair, the abducted shoulder can be pushed and pulled backwards and forwards revealing anterior, posterior and multidirectional dislocations.

A.M. Wiley, M.D.

Pain in the Neck, Hips, and Back

Pain in the trapezius or rhomboid region is usually referred from the neck.

Pain in the trochanter area or iliac crest, or buttock region is usually referred from the lumbar region.

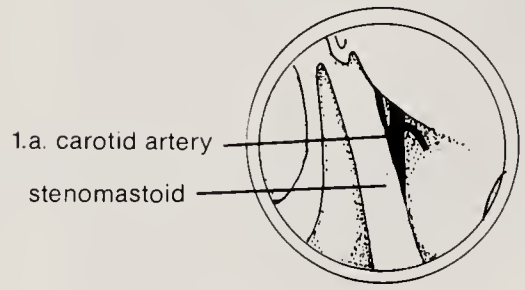
Groin pain is usually hip-related.

To Differentiate hip from back pain: note that back pain is worse on sitting, while hip pain is relieved; Hip pain radiates to the medial aspect of the thigh and not below the knee whereas lumbar pain can radiate laterally or posteriorly down the leg to the foot; Hip pain increases on internal rotation; back pain is worse on external rotation.

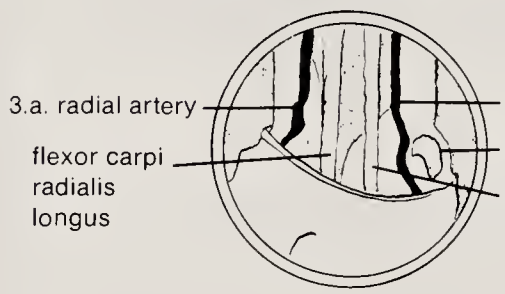
E. Keystone, M.D.

PULSE POINTS

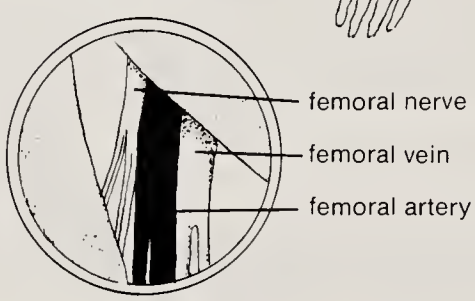
1.a. carotid artery

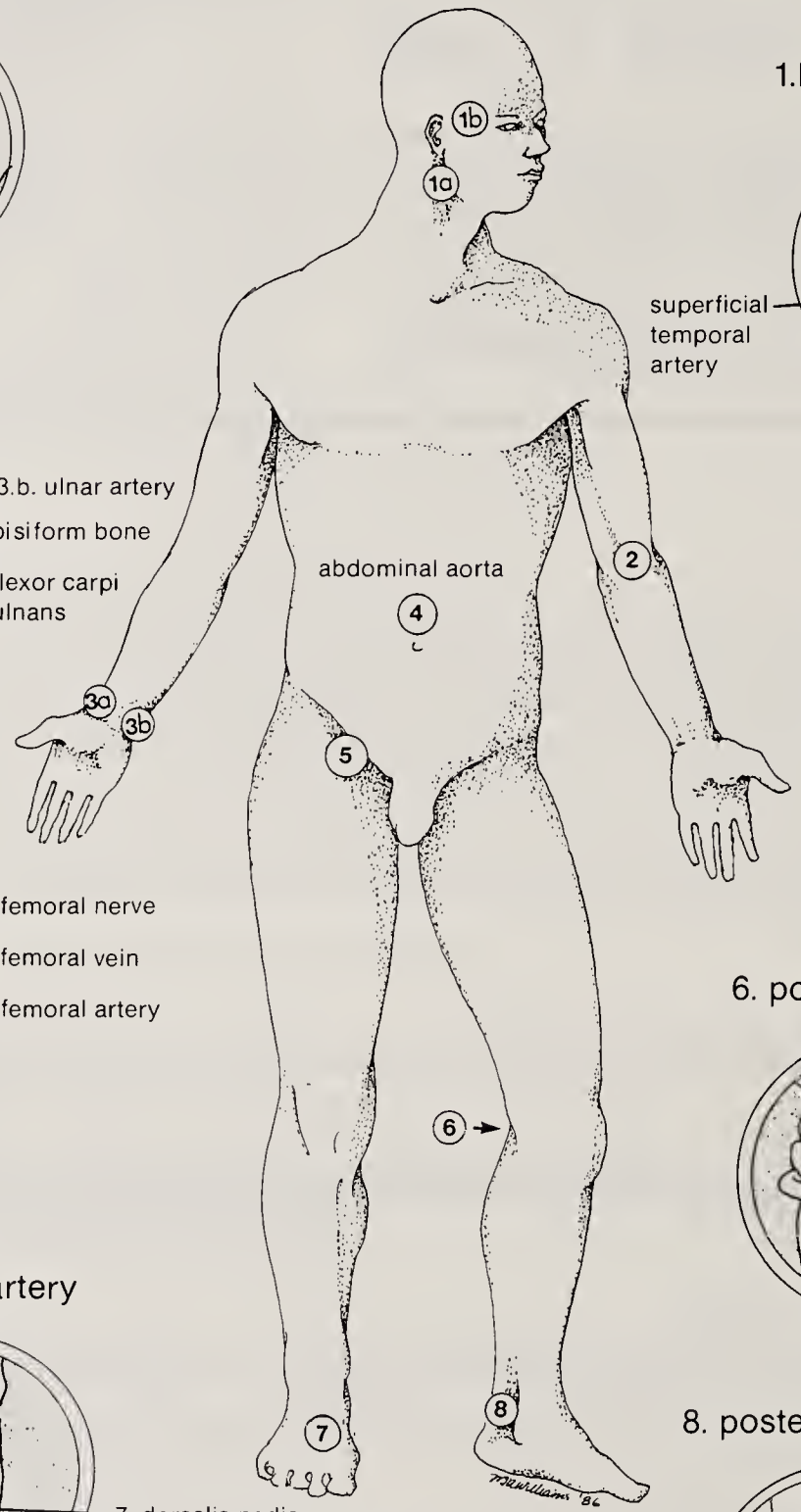


3.a. radial artery



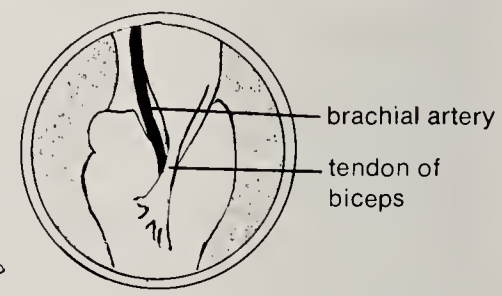
3.b. ulnar artery





1.b. temporal artery

2. brachial artery

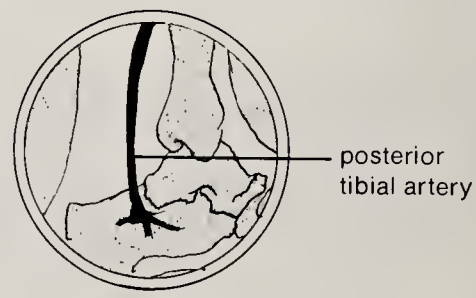


6. popliteal artery

5. femoral artery

7. dorsalis pedis

8. posterior tibial artery



Examination of Arterial Pulses

Introduction

When commencing your examination of the arterial tree, decide what scale you are planning to employ in order to grade the pulses you locate. My scale is as follows:

++++	Aneurysm
+++	Ectasia
++	Normal
+	Weak
+/—	Barely palpable
—	Absent

1. Carotid:
   The carotid pulse (1.a.) is palpable along the anterior border of the sternomastoid at its mid point, pressure is exerted posteriorly and slightly medially. Auscultation should be carried out at a slightly higher level as close to the angle of the jaw as possible so as to be over the carotid bifurcation. The external carotid artery though not palpable directly can be assessed by palpation of the superficial temporal artery (1.b.) just anterior to the ear.

2. Brachial Artery:
   The proximal brachial artery (distal axillary artery) is palpable just behind the belly of the biceps and coracobrachialis muscles, in the groove between these two muscles and the triceps muscles posteriorly. The brachial artery in the antecubital fossa which is frequently palpated and certainly auscultated, lies just medial to the biceps tendon. Support the arms securely and palpate with the patient's elbow fully extended.

3. Radial and Ulnar Artery:
   The radial pulse (3.a.) is readily palpated just lateral to the *flexor* carpi radialis tendon and should be assessed with the wrist slightly flexed.
   The ulnar pulse (3.b.) is best felt by placing three digits along the lateral border of the flexor carpi ulnaris with one digit positioned over the pisiform and hook of the hamate bones. Again, the wrist should be slightly flexed.
   The Allen Test is next performed to show the presence of the communication between the ulnar and radial arteries via the palmar arch. The patient clenches his or her fist while you occlude the radial and ulnar pulses. The patient then opens their hand while you release the ulnar pulse. Prompt return of the colour indicates that the ulnar artery is patent and that it communicates with the palmar arch. The procedure is repeated, this time releasing the radial pulse while compressing the ulnar pulse. Return of colour to the hand confirms radial arterial flow to the palmar arch.

4. Aorta:
   The abdominal aorta should be palpated with the flat of the hand just above the umbilicus. It may be tender and seem very prominent in a thin patient, but an aneurysm will be found to pulsate both anteriorly as well as laterally when palpated from the left and right sides with both hands. The Aorta should be ausculated for bruits along its course commencing at the xiphoid, to the umbilicus and extending into both lower quadrants.

5. Femoral Artery:
   The common femoral pulse lies half way between the anterior superior iliac spine and the symphysis pubis. Palpation above the inguinal ligament will allow the external iliac artery to be examined and moving the examining hand distally will allow the superficial femoral artery to be palpated. Auscultation should be performed at these three positions, as well as along the course of the superficial femoral artery to detect bruits indicative of underlying stenotic lesions.

6. Popliteal Artery:
   The elusive popliteal pulse is readily palpable by grasping the femoral condyles in both hands and flexing the knee slightly. Deep steady pressure by both sets of digits with slight lateral direction will result in successful palpation of popliteal pulses more often than not. Do not ask your patient to bend their knee, do it yourself with the patient trying to relax their leg completely.

7. Pedal Pulses:
   The pedal pulses should be examined while standing at the foot of the bed facing the patient and both feet are examined at the same time thereby allowing comparison. The posterior tibial pulse lies just behind the medial malleous posterior to the Tibialis Posterior and Flexor Digitorum Longus tendons.
   The anterior tibial (Dorsalis pedis) pulse is located just lateral to the Extensor Hallucis Longus tendon and is palpated at the high point of the pedal arch which corresponds to the navicular bone.
   If neither the Dorsalis Pedis or Posterior Tibial pulses are palpable, examine the lateral aspect of the forefoot over the extensor digitorum longus tendons where the peroneal artery may be found.
   Though Doppler ultrasound is very important in assessing the peripheral vascular tree, it does not replace careful palpation of peripheral pulses and usually confirms what you have found after careful physical examination of the pulses.

M.R. Goldberg, M.D.

The Educational Development and Innovations Committee

*Richard G. Tiberius, Ph.D.**

The Faculty of Medicine has developed through its committee structures opportunities for student input into decisions regarding curriculum, teaching etc. One such opportunity is available through the Educational Development and Innovations Subcommittee (EDIS). The difference between this committee and others in which students have membership are a) it is fun, b) it is informal, c) it does not involve voting on issues or being burdened with serious faces.

Our meetings are unusual. For one thing we seem to have more fun than most University committees. In the absence of a rigid agenda, faculty and student committee members raise whatever issues they feel strongly about: How do we reduce passive learning in the large groups? How can we ensure that exciting educational innovations are spread around the Faculty so that they can be tried by other teachers? Do students trust their teachers? Does trust make a difference to learning? Do students receive adequate training in interviewing techniques for ethnic minorities? What is the attitude of the student body toward the administration and vice versa? All this happens while we chomp chocolate chip cookies and sip fruit juice and coffee. Any topic is "fair game" and can be pursued if time permits. The only requirement imposed on the discussion is that, after the problem is clarified, we must attempt to do something about it.

Since there are not a lot of resources at our disposal and since committee members are not expected to do a lot of work, we aim for simple suggestions that will not exceed existing resources. For example, one of our discussions began with a concern that there is too much passive learning in our large lectures. After we defined "passive" and "active", and after we convinced ourselves that there were important advantages to the latter, we tackled the solutions. Our first solution, which required dividing the class into small groups, was judged too expensive.

Students then set us off in a new direction by pointing out the fact that some lecturers can, in fact, generate interaction, even in the large lecture hall. The discussion then turned to the possibility of conducting a workshop in which such interactive lecturers would be invited to demonstrate their methods to teachers. But we were concerned that the interactive lecturers may not be able to duplicate their usual performance without their usual students, especially while under the critical eyes of fellow professors. Inviting students to come to the workshop would lend authenticity to the demonstration only if a large number of students would come. Again, our solution seemed impractical. At this point in the discussion the workshop idea somehow got turned around. Instead of asking interactive lecturers to demonstrate their techniques to teachers at a workshop we could invite teachers to attend the regular lectures of the interactive lecturers where the latter could demonstrate their techniques in their usual class. This is how our "Lecture of the Month" programme was born. The first one was presented on February 25th, by Dr. Keystone. We are planning two more before summer.

Since we meet only once per month, many of the important issues that we have raised, have not been discussed. In fact, we can only consider a handful of issues each year. It would be useful if students and teachers outside of our committee would participate in the discussion of issues relating to the improvement of teaching and learning. The educational section of this journal might be one forum for such discussion. We would like to thank the editors for this opportunity. Members of EDIS look forward to hearing from students and clinicians with issues or suggestions regarding medical education.

Contributions may be sent to Dr. R. Tiberius at:
Division of Studies in Medical Education
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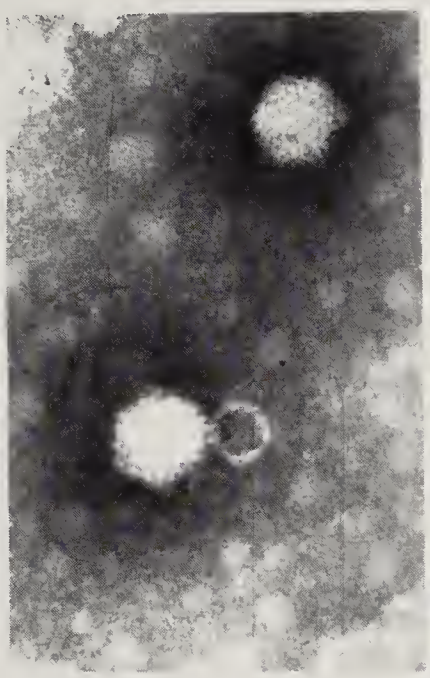

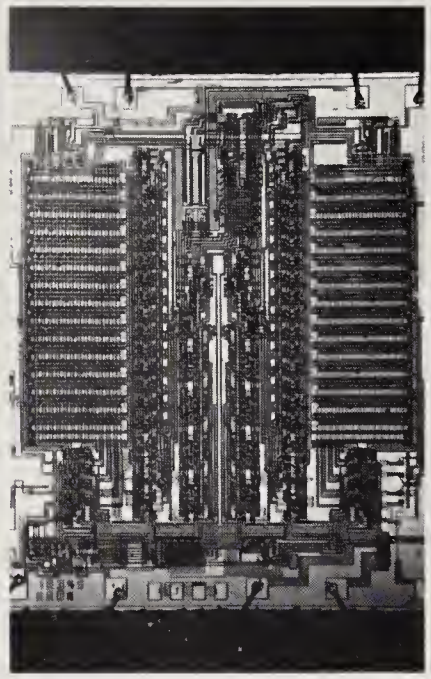

Computer Viruses

by Peter Wan, 8T8

A front page article in the Globe and Mail in the latter half of 1986 brought to attention a very frightening concept — the computer virus (CV). A virus can be implanted and hidden easily in a large software system, for incidence in computers that handle the financial transactions of banks, major corporations, or the data for medical records in a major hospital. Once it has penetrated the system, it may activate itself and begin to erase, change, or move pieces of data creating havoc in the system until the system finally "dies" and is useless. The person who implanted the virus will be in a position to blackmail or control the corporation.

Definition and Etiology

A computer virus is a piece of software that has the sole purpose of destroying the code for other programs or destroying the information kept in the computer system.

The virus may be latent and only manifest itself after a certain time interval — the incubation period. The microprocessors used today to execute programs have built in clocks that may be used to ensure an appropriate lag time before damage begins.

The virus itself is part of a program that is executed infrequently. The actual size of the coding of the virus is small compared to the overall size of the host program and this makes it almost impossible to find — except for the person who inserted it.

There are 2 types of viruses — types I and II. CV type I are transmissible. They reproduce their code within the memory of the computer and on disks and tapes that are shared between computers. The method in which CV I are acquired is via these shared disks or tapes containing a program which have been "infected" from another computer. CV type II are non-transmissible and remain as a single copy in the infected program coding. They cannot be spread easily. The only method of acquiring CV II is by intimate contact with a truly diseased programmer.

Pathology

CVI replicates in the following manner. All microprocessors contain a memory location called the program counter that keeps track of the position of the instruction it is presently performing. Since the coding for the virus cannot be distinguished from the legitimate coding of the remainder of the program, once the microprocessor reaches the beginning of the virus code, it does what the virus code tells it to do. The virus coding instructs the processor to pick a random location, on disk for example, and starting at the position specified by the program counter (which is now set to indicate the start point of the virus code), copy the coding onto the chosen location on the disk. Copying will stop once the special codes indicating the end of the coding for the virus is reached. Any information on the disk at the location picked by the virus will be replaced by viral coding. If the original information was a program, it will be infected. This disk may be used in conjunction with other disks facilitating disk to disk transmission. (The above explanation is just as confusing as some of those in Harrison's. Moreover, it will make perfect sense to a super-specialist in the appropriate field.)

CV II overwrites random locations on the disk but doesn't reproduce itself.

Eventually, all data and programs will be destroyed.

Clinical Features and Diagnosis

The first signs of infection are subtle. Data from certain parts of the disk may be different from what was entered. Data may be irretrievable or non-specific "glitches" in programs may be noticed. As the disease progresses there may be massive data loss with multi-system failure leading to an end-stage disk which is both irrecoverable and now much more than just "floppy".

The differential diagnosis includes a faulty copy of the software disk, drive failure, primary program malfunction, spilling coffee on the disk surface, and a degenerated disk due to other reasons.

CVs can only be diagnosed with certainty by demonstrating the coding of the virus inside the program, an exceedingly difficult task. Without this, CVs are impossible to differentiate from primary program malfunction. Signs that favor the diagnosis of a CV include increasing damage with each execution of the program, clear transmissibility to a second disk, and involvement of data from other programs on the same disk.

Treatment and Prognosis

As of yet, there is no known treatment for CVs. Once infected, a chronic course is developed and relapses and remissions of signs are frequent. The only method of prevention of infection is destruction of the coding of all programs on the disk. Non-program data with CVs are generally not infectious but damage to the information is permanent.

Conclusion

CVs remain a dangerous and frequently very lethal concept. Research into this area has failed to yield diagnostic techniques capable of demonstrating the pathogen or effective treatments once infected. It is hoped that there are enough natural defenses in the field of software development to deter their evolution.

MICAL

AUTHORS: WARREN LEVINSON, MD,
PROFESSOR OF MICROBIOLOGY

ANDREW GARDNER, MEDICAL STUDENT, UNIVERSITY OF CALIFORNIA, SAN FRANCISCO SCHOOL OF MEDICINE, SAN FRANCISCO

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HARDWARE: IBM PC/XT/AT COMPATIBLE
256K; DS DD DISKETTE
IBM DOS 2.0 OR HIGHER

SUBJECT: MICROBIOLOGY COMPUTER-ASSISTED LEARNING

MICAL, which stands for Microbiology Computer-Assisted Learning, is a set of case study programs in clinically important infectious diseases. These programs are designed to reinforce basic concepts in medical

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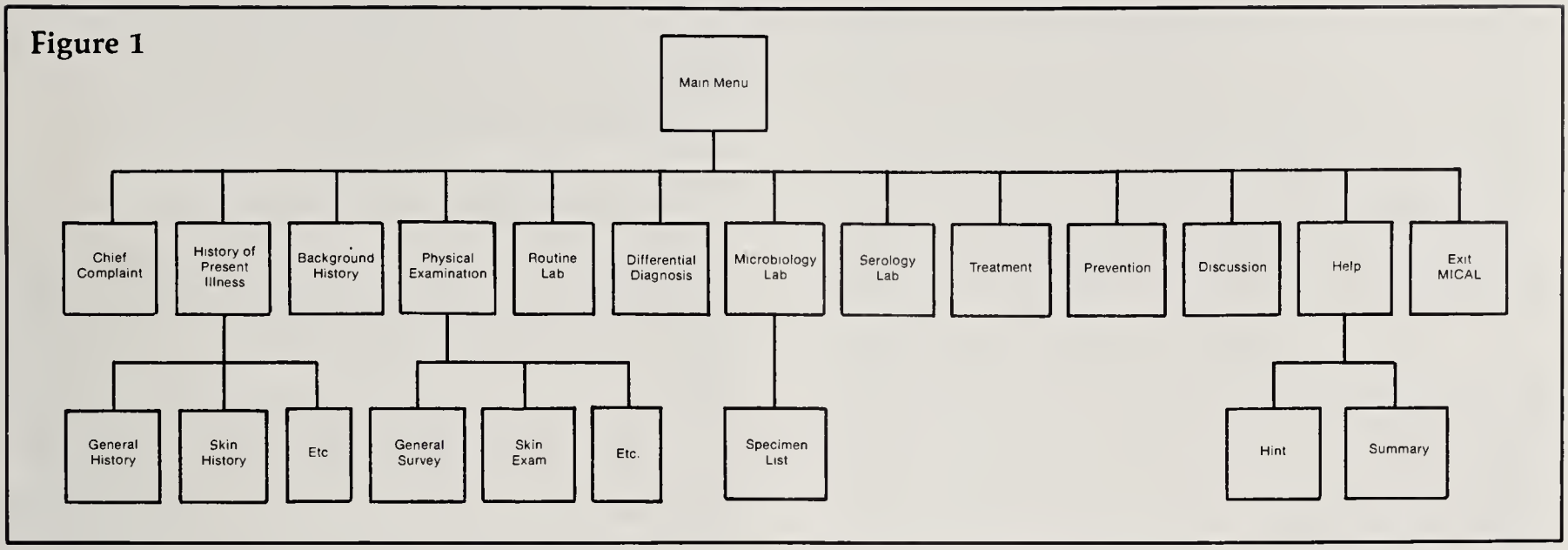

Figure 1: Before ordering the Microbiology or Serology Lab Tests, a Differential diagnosis must be formulated. In order to formulate the Differential Diagnosis, the History, Physical Examination and Routine Lab information must be considered. Help can be accessed from any point in the program.

microbiology using a step-by-step clinical approach involving history taking, physical examinations and laboratory studies. The programs stimulate interest in learning microbiology through their clinical application and emphasis is placed on conducting a complete patient evaluation in an orderly sequence.

MICAL is a menu-driven program consisting of a hierarchy of three levels (Figure 1). The Main Menu (Figure 2) lists 13 options including 'Help' (Figure 3) and 'Exit MICAL' although not all the options are readily accessible. While it is possible to choose 'History of Present Illness' (Figure 4), 'Background History' or 'Physical Examination' to begin the assessment, MICAL does not allow special tests such as 'Serology Lab' to be conducted until the patient has been thoroughly evaluated and a differential diagnosis has been formulated. In addition, a differential diagnosis cannot be suggested until you have considered the history (Figure 5), examination and routine lab work. If at any time the user is unsure of what to do, the 'Help' option provides 'Hints' based on information already accumulated and provides material on topics that may have been overlooked.

MAIN MENU

1	Chief Complaint	8	Serology Lab
2	History of Present Illness	9	Treatment
3	Background History	A	Prevention
4	Physical Examination	B	Discussion
5	Routine Lab		
6	Differential Diagnosis	H	HELP
7	Microbiology Lab	E	Exit MICAL

Notice the special Help option (H). It is included in every menu. If you are unsure of the next step to take at any time, type H for Help and I will provide a useful hint. You can also type H for a summary of your findings or a printed record of those findings.

Selecting E (Exit) from the Main Menu allows you to leave the present case. Select M from any option menu to return to the Main Menu. When you're finished for the day, return to the Main Menu and then type E to Exit MICAL.

Press RETURN to continue.

Figure 2: The program guides the student about possible approaches to the cases.

HELP MENU

1 Hint
2 Summary of Findings
3 Printout of Findings
4 Summary and Printout
M Main Menu
E Exit MICAL

Option 1 (Hint) gives a useful hint.
Option 2 (Summary) reviews all the significant findings so far.
Option 3 (Printout) prints those findings on a printer without displaying them on the monitor screen.
Option 4 (Summary and Printout) both prints and displays the findings on the monitor screen

Type an option number:

Figure 3: The program describes what each option offers.

HISTORY OF PRESENT ILLNESS

1	General History	A	Genitourinary
2	Skin	C	Musculoskeletal
3	Head & Neck	D	Neurological
4	Eyes	E	Hematopoietic
5	ENT		
6	Breasts	R	Review of Systems
7	Respiratory		
8	Cardiovascular	H	Help
9	Gastrointestinal	M	Main Menu

Type an option number or letter.

Figure 4: Any or all of the systems may be studied at the discretion of the student.

GENERAL HISTORY

Prior state of health	Well until 2 months ago when leukemia was diagnosed; treated with chemotherapy and remission occurred
Weight change	Lost 6 pounds in last 2 weeks
Fever	Began 2 weeks ago with 37.5° C to 38° C; no specific pattern
Shaking chills	No
Loss of appetite	Began 10 days ago
Muscle aching	No
Night sweats	No
Fatigue	Began 10 days ago
Repeated infections	No
Chronic illness	No
Malignancy	Acute leukemia (see above)
Diabetes	No
Medication	Maintenance chemotherapy with prednisone, vincristine, and mercaptopurine

Press RETURN for the History Menu or press M for the Main Menu.

Figure 5: A sample general history shows that adequate positive and negative features are included.

Typing the letter 'H' for help will also give the answer to a question that the user may be unsure of. The 'Help' option also provides a 'summary' of your significant findings and this feature may be requested at any point in the patient evaluation. The 'Summary' can be printed out on paper and used as a future review or study aid.

The program begins by recommending that the chief complaint be requested, for example, a 24 hour history of abdominal pain is an 18-year old female. From this point, the student is allowed to inquire about any or all of the systems including the history of the present illness and past medical history. If a gastrointestinal history is desired, then a list of all the relevant symptoms from nausea and vomiting to diarrhea and melena is given accompanied by any significant negatives. A review of the systems and the background history will add sufficient detail to the history to hint as to what the disease could be, but may be disregarded. Proceeding to the routine lab tests supplies information from a complete blood count, urinalysis, and X-rays of the chest and abdomen for a patient with abdominal pain. In formulating a differential diagnosis, MICAL offers nine choices such as hepatitis B, appendicitis and salpingitis, and from which the 3 most likely are chosen. If all three choices are incorrect, the student is asked to try again, but if the correct diagnosis is present together with two poor choices, MICAL proposes a differential of the most likely diagnoses. The student may then proceed to conduct the specialized laboratory tests to obtain the definitive diagnosis. A description of the lab tests may be called upon to aid in making an appropriate selection. If a poor choice is made, the student is allowed a second attempt before the solution is revealed accompanied by an explanation. A similar approach to the treatment program and preventative measures enables the student to learn pertinent details related to the case.

The advantages of such a package are many. It is very user friendly. It simulates an interest in a "dry" topic by approaching infectious disease from a clinical point of view as a physician would do so with an office visit. It encourages the student to evaluate the patient in an orderly, efficient manner. The clinician can be as thorough as possible (which could be potentially time and cost-inefficient) or be selective enabling a quicker formulation of the differential diagnosis. An excellent feature is the 'Help' option which provides hints to guide the unsure user. Finally, a summary of the finding can be also printed for use as a study aid.

There are no major drawbacks to such an approach to learning but the fact that only one disease is covered (albeit thoroughly) per diskette means that only the most clinically significant diseases in terms of incidence and morbidity can be discussed. This package contained only eight infectious diseases (Figure 6) leaving a vast amount of microbiology to be placed on diskette. In summary however, I recommend this package strongly as an adjunct to the formal medical microbiology course because it encourages the student to think logically through a clinical case rather than be forced to memorize facts from a microbiology syllabus.

Lloyd Semelhago, B.Sc., 8T8

Alan B.
January 10th
The patient is a 70-year-old white man who has had sudden onset of chest pain and cough that began 24 hours ago.

Barbara L.
December 2nd, 10:00 AM
The patient is a 3-year-old black girl who has had sudden onset of fever and vomiting that began last night.

Steven R.
December 15th
The patient is a 20-year-old white man who has had a sore throat for the past 2 days.

Carol D.
May 4th
The patient is a 22-year-old white woman who has had a fever and malaise intermittently for the past week and a rash for 2 days.

Ronald G.
September 8th
The patient is a 35-year-old white man who has had loss of appetite and fatigue for the past 10 days and vomiting since yesterday.

May C.
June 3rd
The patient is a 68-year-old Asian woman who has had abdominal pain for the past 10 days.

Bernard R.
April 11th
The patient is an 8-year-old white boy who has had low-grade fever for the past 2 weeks.

Linda M.
February 14th
The patient is an 18-year-old white woman who has had abdominal pain for the past 24 hours.

Figure 6: Brief descriptions of the MICAL patients are provided with the package.

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BOOK REVIEWS

Mortal Lessons: Notes on the Art of Surgery

by Richard Selzer,
Chatto and Windus Ltd. (Publisher), 1981, 261 pages

"I don't know when I'll get the time to read it," I thought after opening the package. The book was sent from a non-medical friend who implored me to read this book as he was sure I would enjoy and benefit from it. He was right, the book was both informative and exciting.

Richard Selzer's **Mortal Lessons** is the third published compilation of his essays which contain amusing anecdotes in addition to presenting serious moral issues of concern to those in or entering the field of medicine. He writes of abortion, tube feedings, and heroic resuscitation all in the manner of a good teacher; allowing the student to arrive at their own conclusions. He discusses problems with which physicians have always dealt such as baldness, kidney stones and dying patients from a historical and philosophical point of view. In all of his comments, Selzer distinctly draws his own line between what is possible in modern medicine and what is proper. The value of the book lies in its ability to impress upon the student, tired from the trek, the importance of morality in medicine.

The manner in which the author writes makes these difficult lessons sink in easily. His style is graceful and precise, moving like a cautery to a bleeding vessel, with a purpose. His articulate presentation lulls you into a comfortable state until, he jolts you back to life with a description of something so moving, so vile, so astounding, you are forced to react in defence of your own sensibility. This book at times makes you laugh, at times makes you cry. It is that effective.

Mortal Lessons received critical acclaim for its ability to present medical anatomy, philosophy and practice to a lay audience. The true value of the book however, is to students of medicine (at all levels) who have forgotten what they felt when they were a member of the non-medical majority. There are no statistics to hide behind in this text, just a description of how brutal the fight for preservation of life and function can be, of how special our profession can be.

This book is gripping, self-reading and inspiring. Forget the impending exam, the patient's history that is due tomorrow.... go buy this book. It will make you sure you have chosen the right way to spend your life.

Blake C. Papsin, 8T8

Literature and Medicine: Psychiatry and Literature

by P.W. Graham, ed.,
The Johns Hopkins University Press, Baltimore, Maryland, 1985, 173 pages

The relationship between art and insanity is as ancient as it is controversial. Most of us have some preconceived notion of a creative genius teetering on the brink of insanity. **Literature and Medicine: Psychiatry and Literature** is a collection of essays which speculate on the condition of the psyche of some creative writers and poets: Margery Kempe, Friedrich Holderlin, Ezra Pound, Hilda Doolittle (H.D.) and Hayden Carruth. As well, other essays deal with the portrayal of psychiatrists in modern drama.

I found this book both interesting and informative. The essay on Margery Kempe, a fifteenth century writer, was particularly engrossing. Margery Kempe suffered from post-partum psychosis which lasted eight months. This psychosis, or more correctly her attempt to explain her vulnerability to psychosis, became Margery Kempe's impetus to write poetry later in her life. A similar scenario is described in the essays on H.D. and Hayden Carruth. I find historical anecdotes of this sort inherently intriguing since they describe the response of brilliant minds to pain of an unknown source. I feel that narratives of this nature are bound to elicit a degree of introspection in all of us. Consequently, reading this book is stimulating even in the sections with somewhat excessive psychoanalytical interpretations.

The quality of writing in all the essays is uniformly high. Moreover, the book, for the most part, avoids lengthy discussions of esoterica.

Literature and Medicine: Psychiatry and Literature would be entertaining reading for any medical student, regardless of one's background in English or interest in psychiatry.

Craig Hudson, 8T8

Multimind: A New Way of Looking at Human Behaviour

by Robert Ornstein,
Houghton Mifflin Company, 1986. 206 pages

Robert Ornstein loves chaos. In **Multimind**, Ornstein shows his impatience with the antiquated, scholarly notion of the mind — a single, imperturbable caboose riding the rails of reason — and replaces it with a new, engaging concept. The mind becomes a ramshackle concoction of individualistic talents, emotions and routines that wage a perpetual battle to seize the main stage of consciousness. These "small minds" are the source of rich and capricious dimensionality of human behaviour. Here they serve as the focus of a hectic but persuasive demonstration of the multiplicity of mental phenomena.

The core of **Multimind** is an exploration of our universal and innate powers that govern awareness of external reality. These primitive elements of the multimind include our sensitivity to vivid information. Quick and alert, small minds kept our evolutionary ancestors abreast of their dangerous, fluctuating world. They are elegantly conceived and cunningly engineered, and so it

is tragic that they are misfits in the modern world. They do exist however, by continuously undermining our attempts to be "rational". As Ornstein points out, we make the same mistakes over and over again — we choose leaders by the cut of their suits and the toys with the kung fu grip. We constantly compare our beliefs with those of others, greasing our thoughts and bullying them into acquiescence with the majority, surrendering our individuality on the slippery slope of comparison, we keep our silence in a crowd. Finally, we simplify the world to ridiculous extremes, making snap judgements and dangerous generalizations from threads of evidence. Our perception of the world is often little more than a pile of flashy headlines without their stories. Ornstein forces us to concede that consciousness is always in an uncertain flux and subject to the quicksilver movements of these sovereign elements on and off its main stage. Underinformed and capricious in our opinions, we reflect a multimind of primitive strategies ill-adapted to the contemporary world.

Ornstein is angry that our simplistic perceptions have reached not only outwards, but inwards, onto the nature of the mind itself. He is exasperated by the narrow-minded academic worship of the ideal intellect dedicated solely to icy logic and rational thinking. He is scathingly critical of the IQ test that ignores the spatial, artistic and kinesthetic talents in the fevered search for the chosen who can score a bingo on the IQ meter.

We are equally simplistic in assessing personality. Like sketching Mona Lisa on a napkin, we reduce intricate and often contradictory characteristics into overly simple patterns. We are constantly engaged in a kind of 52-pickup, collecting tiny samples and piecing them into a kind of fictional coherence. Ornstein warns that too often we ignore the multiple identities of others, preferring to type them with single and wholly inadequate adjectives like "friendly", "arrogant" or "conscientious". Thus, we misinterpret and misunderstand people —the weakness of circuits built for brute speed and simplification rather than for sophistication and subtlety of judgement.

From personality to intelligence to the anatomy of consciousness, Ornstein eagerly pogos from idea to idea, pausing at one only until another catches his fancy. The reader is left racing like mad to keep up with him. The main fault of **Multimind** is that it is so incomplete. The sense of self, the nature of emotion, the role of the rational mind, and the mechanisms of memory and learning remain unresolved, and so his embroidery of the mind is rather less than half-finished. **Multimind** is a dizzying hopscotch over the topography of the brain and it serves merely as an introduction to the hectic and volatile plurality within us all. But then again, well-begun is half-done.

Yeung Seu Yoon, 9T0

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The footsteps are echoing
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In his mind.
They are closer now, yet
His heart does not race
In his mind.
This pretense of control
Is now tangible, and
The taste of power seduces
In his mind.
He talks of particles and
Forces, paths and politics.
They smile, unwittingly
In his mind.

He knows Quality -
Understands its purpose,
Wades through its possibilities,
And so is able to see it all -
Reasons, responses, and the religion.
His mind empties -
All that there was is realized,
And at this summit
Theories and hymns
Lose their meaning
In his mind, and in fact.
A wave of futility, and
Their absolute hypocrisy
Overwhelm him.
The facade shatters
With the impact of actuality,
And he succumbs
In his mind, and in fact.

Shera Vania, 8T9

Bitter Thoughts

When I was younger, caring, full of life,
I strove for truth in all my words and thought.
My faith would heal, and love would end the strife
Between my neighbour and me. But all for naught.
My caring could not wake the unconcerned,
The truth was buried in their mockery.
They took my love, while fires of hatred burned
Unabated in their hearts. Hypocrisy
I've learned, is such a part of human nature.
I lie now, I fit the message to the fool.
They think my cynicism's very clever,
And love? It's just another useful tool.
I gave my best, you mauled it savagely,
It's dead. Now both my soul and I are free.

Ambrose Cheng, 8T8

Châteaubriand

Sprawling before me winks the sparkling sea.
A glaring sun conceals imperfections
To make the pale horizon alluring.
For a moment an illusion is mine
That the thin line contains uncharted lands
And that I am still free to discover them.
But still that world, so altered from the orb
I once knew, holds magnetic mysteries.
Passing winds ship over this long grass,
Beyond my hill, beyond my cliff to tell
Of voyages not like mine, not on ships,
But in rooms locked away in the mind.
No more simple secrets remain to spark
Curiosity without strings that bind.
Men dwell inside themselves; as now I must,
Through the sea birds call and the lure's still strong.
No tears of mine can restore earthly grace,
Nor replenish that divine sphere's worn face.
Both wind and water tease my inert grave
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Yvonne Opalinski, 9T0

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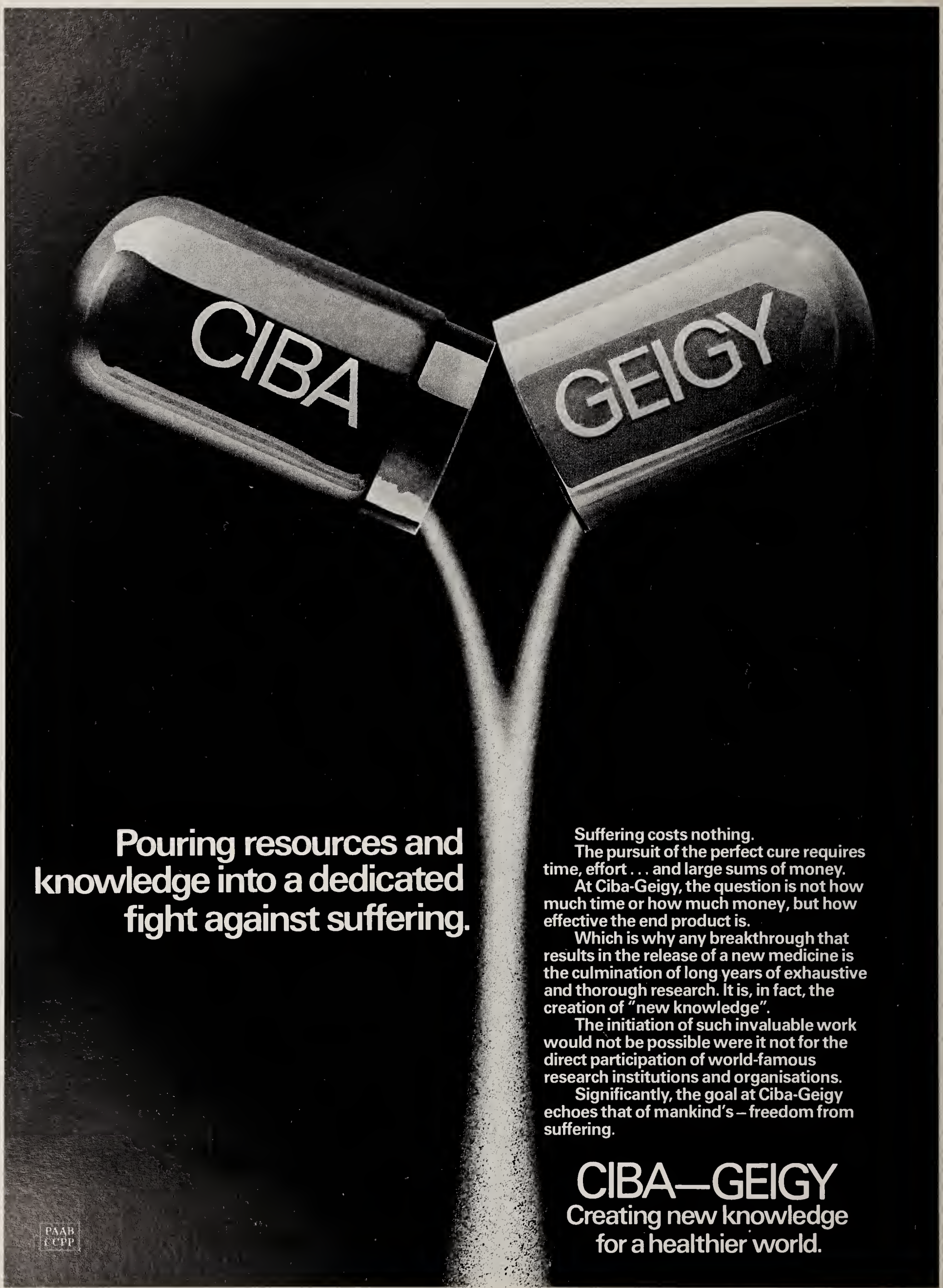

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